POPULAR AVIATION

Combined with Practical Mechanics, Including
Aeronautics and Aviation Stories and Mechanics

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The Attempted Kidnaping of

by Lieut. ★★★★★

Illustrated by Herman R. Bollin

I LAUGHED at the young lieutenant across the table. The plan he had just outlined to me and several of my comrades-in-arms was, I thought, the most fantastic thing I had ever heard. Kidnapping Baron Manfred von Richthofen? Utterly impossible! An idea given birth by the uncorked bottles and frequently replenished glasses during the R. F. C. squadrons' binge.

But Lieutenant Clarke was so sincere and downright enthusiastic that Hodge and I were compelled to listen. (The names used in this article are obviously not the correct ones.) The plan was a swell story conceived by sheer imagination without the slightest possibility of success—that is, I thought so then.

Both Hodge and I agreed that "The Bloody Baron" was a relentless, disturbing fear that gnawed at the self-confidence of our fledgling pilots that had just come from England to be attached to a British Wing. News of the Baron's exploits and his list of victories, which were increasing with alarming rapidity, was one of the greatest psychological barriers our Air Force had to overcome.

To kill the Bloody Baron was the aim of every pilot; he seemed to possess the charmed life of an unkillable killer. Clarke reasoned if the Bloody Baron could be captured, the humiliation to the great Ace and the blow the German Air Force would receive would be staggering. It would surpass the destruction of a whole German squadron. It would make a joke of the German airmen; and a new fighting spirit would develop among the Allied pilots.

LIEUTENANT CLARKE went over his daring plan in detail; he said:

"I don't blame you chaps for thinking I'm shell-shocked or something, but I say we've got an even break. Five miles south of here, there's a British two-seater outfit. Those ships are made to carry two men, photograph and wireless equipment—a load equal to three men.

"I know a British pilot down there. I mixed a drink for him he will never forget. I'll wager I could get him to land here after an afternoon patrol. It would be a simple matter to hold him here and take off in his plane."

"Then what?" I asked dubiously.

"The three of us could take off and land just at dusk on a field near the town where the Baron's circus is now located. You say 'Intelligence' has the information the *Reitmeister* appears to have moved into the town for a stay. You can find out where he's billeted. The three of us could get the drop on him, somehow, and force him into the plane. Boy! Would we get medals for a job like that? Nothing short of general's stars would be ours! Imagine the great Baron's disgrace, not being able to defend himself on the ground—being captured by three clever Yanks. Why, say, it'd win the war!"

I asked: "How do I fit in? I'm not a pilot."

Clarke passed my question off with an impatient shrug of his broad shoulders. "You're working on Intelligence. You can keep us posted, get maps and information of nearby fields that we could land on. . . ."

It must have been Clarke's enthusiasm that got under my skin, or my indomitable love of adventure. I clasped his hand. Hodge put his hand on ours and we swore our allegiance as "The Secret Three" to make the daring attempt to kidnap the Bloody Baron.

Hodge, the more serious of the three, said: "It's possible for three of us to squeeze in the two cockpits going over, but if we knock the Baron out and strap him on a wing beside the fuselage that makes the weight of four men. It can't be done on those old reconnaissance jobs. We'd crack-up taking-off."

It was then we matched; odd man was to stay behind with the enemy and sacrifice his freedom that Richthofen could be taken back to the Allied lines a prisoner. I was the odd one—the sacrifice man.

* * *

BEFORE the week was over, something unforeseen occurred that completely upset our carefully worked out plans. A German two-seater, fighter-reconnaissance Halberstadt, was crippled and forced down on Clarke's

A STARTLING adventure with the abduction of von Richthofen as its objective, conducted with reckless abandon by three American airdevils.

The author of this story, for purposes of his own, is anonymous—largely for the reason that he does not wish to involve certain of his comrades who participated in this raid.

von Richthofen

squadron's field. As I spoke German, I was sent over to interrogate the pilot, who had escaped serious injury, although his observer had been shot to death in the air by Hodge. Hodge had also been put in the hospital with a painful but not serious Spandau bullet wound.

I took the captured pilot off in a small room where we could be alone. The first thing he said surprised me greatly.

"I am an American," he said in broken English.

"I'm the Kaiser," I replied. "What do you want me to do, have Pershing give you a medal?"

"*Nein,*" the pilot said. (I shall name him Knauer, for that's about as far from his real name as I can think it.) "I want to fly for America. *Yah, doss ist.* Fly for *mein* country. *Gott in Himmel,* don't put me in prison. I know much about the *vericht* I have been flying *mitt.*"

To me it was a thinly veiled plea for leniency. But, as I questioned Knauer, I learned that he had been born and raised in a city in the Northwest known for its large German-American population. At the age of six his parents had both been killed in an automobile accident and an aunt had taken him to Germany, where he was educated and, at the outbreak of the war, forced into military service.

As a pursuit pilot he had killed several Allied pilots. When American pilots began arriving at the Front he had himself transferred to a reconnaissanee squadron so that he would not have to shoot down the Americans, he claimed. He insisted that he be permitted to fly for America—the land of his birth. Of course, this was officially impossible.

That night, however, he did fly for America *secretly.*

AT dusk, Lieutenant Clarke and I, wedged together in the rear cockpit, took off in the Halberstadt with Knauer at the controls.

He had promised to take us to the Bloody Baron's favorite *estaminet*—there was a certain pretty blonde *madchen* there—and assist us in tricking the Ace into our trap. Knauer knew full well, one false move on his part and we would have presented him with a .45 caliber automatic slug.

Knauer pointed out a cleared space behind the town and brought the ship down to a beautiful landing. Then with our hands on our automatics and Knauer leading the way, we advanced toward the inn through a winding street—dark and still. A sentry's challenge rang out, pierced the darkness, but Knauer satisfied the soldier.

Arriving at the inn, Knauer went inside while we watched from a side window. He returned, impatient to be off, explaining the Bloody Baron had just left, going in the opposite direction. We hurried down another dark street and finally overtook a man whom we made out to be an officer.

Knauer spoke the title and name of the great German Ace. The officer wheeled.

Quick as a flash I leaped forward. As the officer turned I caught him behind the ear with the butt of my service automatic. He dropped with a strange sigh to the cobblestones. It was so dark we couldn't make things out clearly. Excitedly, we began carrying the Bloody Baron along the street. The sound of an approaching automobile startled us. It came without lights.

"Quick, **stand him up!**" I said.

I put the unconscious Baron between myself and Clarke; suddenly I began singing a little German song I learned as a child. A man stepped from the car which had halted in front of us and we quickly learned he was a Staff Major. It looked as though our goose was cooked. Instead of taking the Bloody Baron back to our airdrome a prisoner, we were in danger of being taken prisoners.

The Staff Major demanded to know what we were doing and why we didn't stand at attention and salute. Knauer came to our rescue. He saluted smartly; explained he had found the three officers—all pilot friends of his—out after hours and intoxicated and had taken us in charge. That one had fallen and struck his head and was injured.

The Major evidently was thirsty; inquired where good wine could be obtained, and Knauer offered to show him

the way through the dark village. As we wore flying togs instead of our uniforms, the Major's suspicions were not aroused. We disliked to let Knauer get away from us, but we were helpless to remonstrate.

CLARKE and I supported the unconscious Baron between us and continued on our way. We had the Baron; he was worth a thousand Knauers. We met the sentry again and I gave the password I had heard Knauer utter. Back beside the plane the Baron regained consciousness and his German profanity was as picturesque as it was eloquent. Clarke and I both learned things of our departed ancestors that we never remotely suspected.

We threatened to shoot the Baron if he refused to get in the plane peacefully. I think Clarke chided him for being the greatest Ace in the German Air Force and being taken prisoner behind his own lines, about to be turned over to the American authorities; he ended: "What does the great Baron von Richthofen think of that?"

The officer burst into hearty laughter. He said he wasn't Richthofen, that the joke was on us. We refused to believe him. Clarke ran the risk of striking a match. Its flame revealed a face that never could have been the Bloody Baron. The insignia on the man's uniform was that of a veterinarian of artillery! Had Clarke and I been sold out by Knauer?

We heard running footsteps on the cobblestones of the roadway near by. That flame of the match had been seen; soldiers were running to investigate. Could Knauer have revealed our identity to the Major? Taken off our guard, the officer began shouting for help. We put him to sleep. There was nothing to do but get into the Halberstadt and chance a take-off in the darkness.

Clarke had planned well for this on landing. He had the plane turned around and Knauer had given him the layout of the field. Clarke got in and I spun the prop. As I climbed in, Mausers began crackling and lead whistled over our heads. There was no time to bring the veterinarian back as a "souvenir."

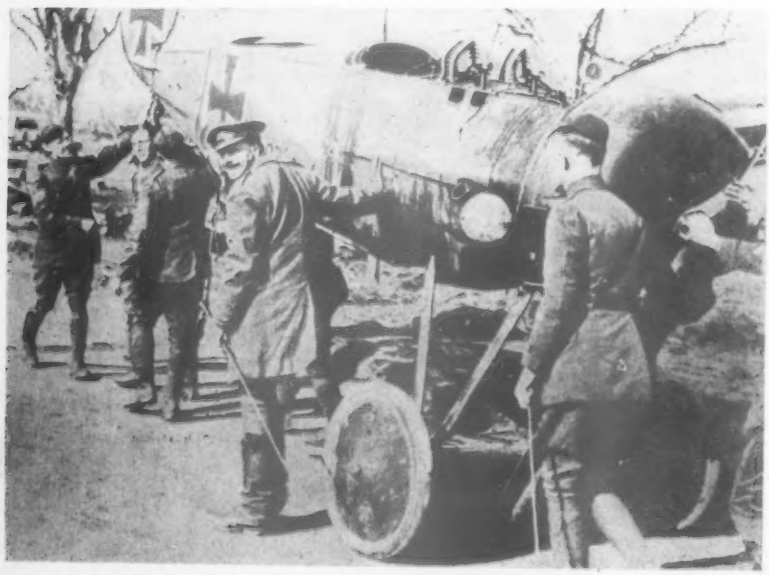
Clarke made a remarkable take-off, one in which I held my breath and cursed in bitter disappointment over our tough break. It seemed like hours later when Clarke landed at his 'drome by the aid of gasoline can flares set by mechanics that we had enlisted to help us before the take-off.

As Clarke's squadron was back at the village, two miles away, celebrating in customary war-front style the victories of that day, no high officers ever heard of our daring exploit. We swore each other to secrecy and never revealed what we had attempted for fear of the serious consequences.

A FEW days later *Unter-leutnant* Knauer landed a ship under control on another American field. I never saw him, but I always felt he wasn't forced down. None of our pilots were in the air near him. Loyal to the land of his birth, he evidently refused to fight further against our pilots.

As Lieutenant Clarke recently went to the airman's Vahalla, I feel I'm breaking no confidence to tell this story now. It was a grand adventure and we were sorely disappointed with our experience with an unimportant horse doctor instead of the Bloody Baron. Such are the fates of war!

Who knows or can predict the results if this raid were successful? Would the capture of von Richthofen demoralized the Imperial German Air Force as we so warmly imagined at the time by showing that even the overlord of the flying circus was mortal?



Richthofen's plane being trundled from the field just after it was shot down.

Launched from Balloon

Just before cutting the glider loose from the smoke balloon.

WILLIAM G. Swan, Aurora, Ill., has launched his rocket glider from a hot air balloon.

After cutting loose from the balloon, he stayed in the air four minutes with the assistance of the rockets. He claims that he will be able to secure a greater duration with larger rockets and by ascending to a greater height before starting his glide.

Solving Airport Problems

AIRPORT and city officials throughout the width of the land are wrestling with the problem of providing quicker traffic facilities between airports and the business districts of the cities they serve.

Newark has tackled the question intelligently, and by Nov. 1, an impressive elevated highway costing $22,500,000 leading from the Newark Metropolitan airport—by far the busiest in the world—to New York City will be opened to traffic. It will mean that the air traveler alighting at Newark can reach the New York side of the Holland tunnel in nine and one-half minutes.

In England, legislation to prevent the obstruction of airdromes is being pressed by the London Chamber of Commerce. Prevention of factory buildings and tall chimneys in the vicinity of airports and broad modern highways leading to city centers are sought.

In Paris a group of architects is advocating reserving the esplanade of the Trocadero on the right bank of the Seine opposite the Eiffel tower for use of airplanes and the building of a terminal, thus relieving the congestion at Le Bourget and bringing passengers into the center of the city.

XUM

Airplanes and Lightning

NO INTENDING traveller in British air liners need be worried by the extraordinary accident to the Imperial Airways machine "Horatius," which apparently was struck by lightning over Kent while flying through storm clouds.

Damage was done to the propellers, the electrical equipment inside the machine was wrecked and some windows were blown out, but the big plane was never in serious danger and the pilot was able to fly back to the London air station, where most of the passengers were transferred immediately to another Paris-bound machine.

Every British airplane is carefully "bonded." That is to say, every metal part is joined together so that electrical currents may pass freely through it. The whole aircraft thus becomes a conductor and not a single authenticated incident has been reported of fatality or fire through lightning striking a properly "bonded" machine.

On the other hand, unbonded aircraft have been destroyed by a lightning discharge. In 1927 four American naval airmen were killed when their plane was struck, and in 1930 a Czechoslovakian air liner flying on one of the regular European routes crashed with the loss of twelve lives.

Frequently an airplane, especially if it be flown through the clouds, rain or snow for an appreciable time, gathers a charge of static electricity which it discharges immediately when the metal tail skid touches the ground in landing. Machines with tail wheels, in which the tires insulate the machine from the ground, have a short length of bare wire trailing from a point near the tail to make contact on landing.

More Aviation Novelties

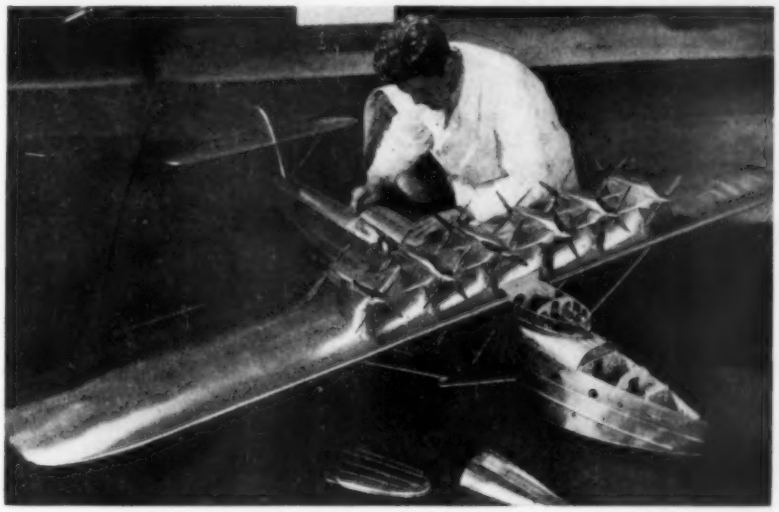
THE range of usefulness of the airplane is steadily being broadened. Over in Scotland, Fire Chief Methven of Edinburgh, has asked the city to construct a platform for the takeoff of planes on top of the fire station.

He foresees the development of the helicopter as a piece of fire apparatus. A few weeks ago two trained chimpanzees were flown from Atlanta, Ga., to an animal farm at Nashua, N. H., so that they might be present to do their tricks for week-end guests.

Collides With a Gull

C. E. LINE was making a circular flight above Oceanside, Calif., when he heard a thud, then a splintering noise and saw feathers fly from the region of his propeller. Before he could cut the motor, the unbalanced prop had stalled his engine. He consequently put the craft into a glide and made a perfect landing on the hard sand at the water's edge. He had collided with a bird in mid-air.

A Giant Wind-Tunnel Model



Putting the finishing touches on a wind-tunnel model of the DOX-3.

MODEL makers, both amateur and professional, will be interested in this large wind-tunnel model of the new Dornier DOX-3.

It is made of duralumin, exactly to scale in every part within very close limits, and when mounted in place within the wind-tunnel, makes it possible to gain accurate estimates of the performance of the full-size ship.

All of the forces acting on the model are measured by precision balances so that its carrying capacity, resistance and stability can be computed.

The Comper-Swift Wins King's Cup

THE Comper-Swift, an English lightplane, is always of interest because of its established place in aviation and its consistent record making abilities.

As will be seen from the accompanying photograph, it is a high wing monoplane with the fuselage and hood about level with the wing. Its diminutive proportions can be judged by a comparison with the man standing beside it.

Its wings can be folded back in one operation so that the ship will fit in a garage or other building 12 by 9 feet. This requires only the removal of two pins and takes about 60 seconds.

Specifications

Span	24 ft.
Length	18 ft. 4 in.
Useful load	445 lbs.
Gross weight	985 lbs.
Landing speed	40 m.p.h.
Cruising speed	120 m.p.h.
Climb	1,400 ft. per min.
Engine	75-85 h.p. Pabjoy

It is interesting to note that a Comper-Swift monoplane equipped with a Gypsy III engine, entered by the Prince of Wales, in the King's Cup Race, averaged a speed of 158 m.p.h.

Showing the characteristic fuselage and wing mounting of the Comper-Swift.

New U. S. Light Bomber Tested

Official Photo, U. S. Army Air Corps
The Martin XB-907 light-bomber in test.

HERE we see the new U. S. Air Corps light bomber in flight. It is known as the Martin XB-907, a mid-wing monoplane with a metal monocoque type fuselage and retractible landing gear.

The XB-907 is equipped with two radial Wright engines mounted in front of the wings and rather close to the fuselage. This permits of greatly improved vision for the personnel as will be noted from the position of the front cockpit placed well in advance of the wings.

René Fonck Turns Inventor

A NEW invention by Captain René Fonck, most famous of French war aces, promises to remove forever the threat of aerial bombardment of great cities in any future war.

Day-bombing of cities has long since been recognized as a practical impossibility in the face of anti-aircraft guns and defensive services of fighting planes, but from the days of the World War, night bombing has seemed almost impossible to prevent.

The defensive planes, which are the only certain means of keeping off hostile bombers at night, are blinded in the dark. They cannot find the bombers, nor keep them in sight long enough to attack them and modern bombing planes move so rapidly that they easily escape searchlights from the ground.

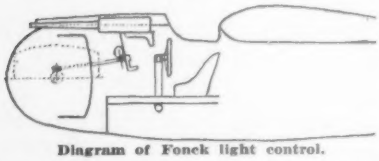


Diagram of Fonck light control.

Against bombers at night, anti-aircraft guns on the ground are almost useless for the same reason and it has been demonstrated that modern bombers, fully loaded, can fly high above any curtain of cables suspended from balloons.

But Capt. Fonck's invention and the system of defense based on it, promise to do away with all these difficulties at once. It consists of a powerful focusing search-light mounted on each side of the fuselage of a single-seater fighting plane, and synchronizing them with the four machine guns mounted by the airplane in such a fashion that the bullets from the machine guns strike the exact spot where the center of the beam of light falls.

During the World War, this system was attempted with searchlights and cannons from the ground but failed because while the beam of light travelled in a straight line the shell from the gun followed a curve, and the two could not be synchronized. Capt. Fonck pointed out that a bullet from a fighting airplane has a much shorter distance to travel toward another airplane than a shell from the ground and that, therefore, its path would be straight.

By an ingenious system of gears, he has arranged his night-defense plane so that all the aviator has to do is snap on his searchlight. After an interval of two seconds, the machine-guns start firing automatically, their bullets striking exactly in the center of any object the searchlights pick out.

Preliminary trials, carried out under the direction of General Barres, indicate that the system is a complete success although the machine used, a Giore and Olivier single-seater, was merely fitted temporarily with the searchlights and the full synchronizing gear was not installed. Many hits were made on targets towed by airplanes at night and even with the hindrance of clouds.

The system of defense for Paris to be based on the use of the new Fonck invention includes the location of numerous sound-locating posts at some distance from the French capital, which will pick up the motor-sounds of planes advancing toward the French capital. Upon being warned by these stations, the fifty or more fighting planes in the defence-zone of the city (within a distance of fifteen miles from the heart of Paris) will take the air, and be ready to attack hostile bombers long before they can arrive over the city.

Television Takes to the Air

FOR the first time, television took to the air in California. The giant trimotored plane roared along at 120 miles an hour while the occupants watched a shimmering image transmitted from the ground five miles away and 5,000 feet below.

This feat was made possible through the development of an entirely new type of television receiver that makes it possible to transmit television images to aircraft.

With windows sealed tight, to darken the interior of the plane for better vision, the plane took-off. A moving square of light was first seen as they left the ground. Then it grew brighter as they approached the vicinity of the transmitting station. Then the images became brighter and only broken from time to time due to the movement of the airplane.

Possibilities claimed by inventor are that pictures of the airport can be transmitted through the fog to the pilot. Also that passengers soon may be entertained as they travel through the air, that miliary operations may be changed through its use in warfare and that the accuracy of weather information may be very greatly increased.

Airplane Aids Round-Up

AN airplane round-up of 5,000 wild horses recently took place in the northwest. These horses were ranging the mountain wilderness of Southwestern Oregon, Northern California and Northern Nevada. The bucaroos of the skies flew low over the bands of horses, frightening them to the lowlands. There they were rounded up and corralled.

Cages for Gunners

THEY'RE cooping up the gunners in windowed cages over in England. Here we see the gunner, protected from the wind, making observation through his conservatory.

Observation cage mounted over cockpit.

Russian Airlines Cover Vast Distances

by CARL HAESSLER

Airlines, as in the United States, are of great importance in Russia, because of the tremendous distances that must be covered

THOUGH far behind the United States in number of miles flown, the number of established lines and completeness of airports and other facilities, the Soviet Union presents many similarities in aviation.

Railroad men, like President Ralph Budd of the Burlington and Superintendent Charles Gill of the Baltimore and Ohio, were astonished to find on a technical tour that the physical problem of the Soviet railroads was very much like that of this country. There are the same or even greater distances, similar climate, vast prairie stretches and some mountainous terrain. A population about a third greater and the same commodities, roughly speaking, to be hauled.

Soviet aviation also has its striking similarities to American flying in the commercial and civil division and in addition it has a ticklish military problem through having neighboring countries with highly developed air combat units. The European countries are on its western border and Japan is a next door neighbor in the east. There are no protecting oceans like our Atlantic and Pacific to separate them from enemies.

Russian airplanes are even more vital to that country because the railway system is underbuilt. Against America's 250,000 miles of railway, the Soviet Union can show only 50,000. The Trans-Siberian is a mere single-track much of the way. Accordingly, the 6,200-mile airline from Moscow to Vladivostok, equipped for night flying and with radio and sanitary facilities for passengers, is a tremendous lift in solving that country's communication and rapid passenger transport problems at present.

"Soyuzphoto"

A Russian transport plane used for airline service in Russia. This five motored plane is a recent development.

The first regularly operating airline was established between Moscow and the German border at Koenigsberg just ten years ago. At the end of last year there were 41 lines. Over 20 new lines have been opened in 1932. The distance flown in 1931 by civil planes on regular lines was 4,200,000 miles while this year it is expected to exceed 6,000,000 miles, an appreciable gain.

The length of the established lines is more than 30,000 miles, still far behind the United States but longer than any other country. The aviation section of the famous Five-Year-Plan was completed a year ahead of schedule.

Some of the airlines penetrate where not even railroads or automobiles have made their way. This is particularly true of the planes that make regular trips over the Roof of the World, the Pamir plateau in Central Asia from the western Chinese border to Armenia. The flyers reach an extremely high altitude and the 300-mile trip is made in four hours. By any other way it would take almost a month.

Aviation has also brought the so-called frozen wildernesses of northern Siberia into touch with the civilized world. Seventeen lines, including one by seaplane that touches all cities on the Soviet Pacific coast, are now in operation. Valuable discoveries of mineral, animal and vegetable wealth have been made by scientifically equipped airplane scouting parties.

"Soyuzphoto"

Air view taken from an airplane over Leningrad, Russia, during the celebration of the Lenin anniversary. Note the troops gathered in the square and in the avenue entering the square.

ALL-THE-YEAR flying was still a novelty in the Soviet Union as late as 1930 when only one line operated every day. Last year enough beacons and emergency landing fields had been established to permit flying on most lines winter as well as summer while modern airports have also multiplied in number and completeness.

The Leningrad airport, for example, is a combination for seaplanes and airplanes and has two hangars for airships. A regular aviation city, with apartment buildings and recreation centers for the flying and technical personnel and their families is part of the port. Attached are aviation schools, weather station, radio station, immense garages and repair facilities and what the Russians call a kitchen factory, that is, a monster restaurant and kitchen where the entire aviation city may eat or take out meals cooked there and consume them at home or elsewhere.

Moscow, the flying center as well as the political capital of the Soviet Union, also has an immense airport with modern features. The aviation schools and technical institutes, located in various regions, are training 18,000 students this year.

Aviation has captured the imagination of practically the entirely Russian people. The Aviation Society has a large

enthusiastic membership and publishes several journals in some of the 50 or more languages used in the Soviet Union by the population.

At the celebrations of national importance such as the anniversary of the November, 1917 revolution, corresponding to the American Fourth of July, evolutions by squadrons of airplanes over the Red Square in front of the Kremlin in Moscow and over the former Czar's Winter Palace in Leningrad reveal the skill and daring of the airmen and the mechanical perfection of their machines. Similar demonstrations on a smaller scale thrill the crowds in other centers during this period.

The hero of the Russian flying fans is a veteran of the imperial air corps who joined the revolution in 1917. He was captured by the counter-revolutionary forces in southern Russia a year or two later and was compelled at pistol point to fly for the reactionary czarist officers. But he daringly made his escape by unexpectedly looping the loop, dumping the doomed officer out with pistol and all and making his escape to his comrades in the opposing Red camp.

While the United States in 1930 sold more aircraft engines to the Soviet Union than to any other country except Germany and more parts than to any other country except Canada, Russia has been building extensive up-to-date airplane plants of its own and has turned out very creditable machines.

Plans for an all-metal airship made of an aluminum alloy, 160 feet long with a 540 horsepower motor developing 72 miles an hour and with a capacity of over 8,000 cubic yards have been worked out by the Leningrad Scientific Research Institute for Aviation, located at Leningrad.

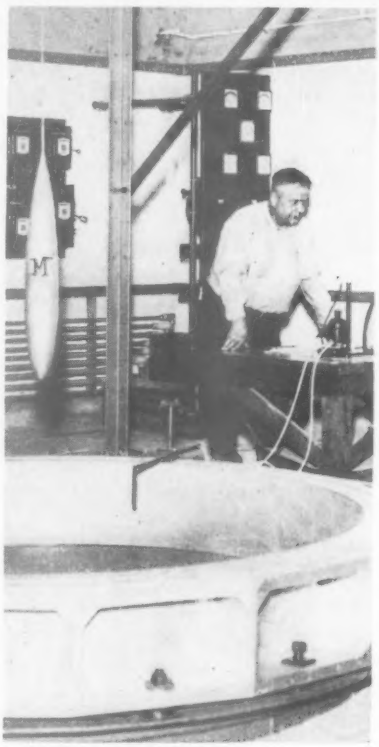
Even more than in the United States, the airplane is a jack-of-all-trades, particularly in Russian agriculture, including animal and fish husbandry. Airplanes lay down smoke screens around fruit orchards to fight off frost. They dust crops to combat pests and even use poison gas in regions where the presence of livestock does not make it dangerous or fatal in its effects.

They scatter mineral fertilizer. They sow rice fields from the air and are experimenting with other crops as well. They use electrical devices to lift fogs. They transport baby fish from their home in the Caspian Sea to the Aral and other bodies of water. They are employed as auxiliaries in the whaling industry. They assist hunters for the fur trade. They are scouts for the great icebreakers in the polar seas.

And, of course, they carry on the routine work of airmen all over the world, the daily task of transporting passengers, freight and mail. The military section goes through its maneuvers. And every year by amazing leaps the entire aviation department of the Soviet Union develops, forging ahead and looking to the time when its mileage, its equipment and its achievements will equal those of its only serious rival, the United States.

END

Guggenheim Airship Institute Begins Work



Here we see the dirigible hull (M) under test and suspended over the mouth of the tunnel.

TESTS are now being made on airship models in the vertical wind tunnel at the new $60,000 Guggenheim Airship Institute, Akron Municipal Airport.

For weeks, Dr. Theodore Troller, resident director of the Institute and his assistants, have been busy setting up equipment and assembling the wind tunnel.

The first test made was to determine the characteristics of the wind tunnel itself, since the tunnels throughout the world vary to some degree. It is important to compare their characteristics so that the information gained from each can be coordinated with that obtained in the others.

To this end, Dr. Troller is in possession of two airship models prepared by the British National Physical Laboratory, Teddington, England, where the first scientifically operated wind tunnel was built in 1903. With these models problems based on the immediate needs of the airship industry are being undertaken.

One of the first problems is the determination of the socalled "boundary layer" or that portion of the air immediately adjacent to a moving body. It is important to know what effect the many protrusions of an airship, such as the hull, ventilation hoods, outriggers, radiators and water recovery systems experience when exposed to this boundary layer.

The forces acting upon an airship, near the ground and adjacent to large docks, are being examined. There is much still to be learned about the forces acting upon a ship in gusts and local upward and downward currents and also upon the behavior of a ship in curved flight.

In a tower built on the roof of the building, synchronized investigations of air conditions over the entire airport will be conducted in cooperation with the Goodyear Zeppelin meteorological station.

The models which are being used in the vertical air tunnel are connected with special hydraulic gauges which will measure with extreme accuracy the forces acting upon them. One of these gauges, called a "manometer," will measure fluctuations down to 1-200 of a millimeter pressure. The wind tunnel produces a 125 m.p.h. air stream.

The new building contains, in addition to the wind tunnel, laboratories for aerodynamics, meteorology and structural testing, a library classroom, shops and offices. For the next five years it will be operated under the scientific supervision of the California Institute of Technology with Dr. Theodor Von Karman, formerly of the Technical University, Aachen, Germany, as its general director.

Dr. Von Kaman has had much to do with putting the Aachen Institute on the map scientifically speaking. He prepared the main outline for the wind tunnel in Pasadena at the California Institute and also built a similar aerodynamic research institute for an industrial concern in Kobe, Japan. The Akron Institute is the fourth laboratory built under his supervision.

From the accompanying photographs it will be seen that the construction of the new wind-tunnel departs considerably from the horizontal tunnels commonly used in airplane research. It is evident that the vertical airstream presents many advantages, among which is the simplification of the model suspension.

View of the tunnel taken before the completion of the building.

Whither Is Speed Leading Us?

by CHARLES W. PURCELL

The higher the speed, the lower is the safety factor. This is the theme of the following article, the last article written by this author before his death.

It is with deep regret that we announce the death of Charles W. Purcell. Capt. Purcell, long a favorite with the editors and readers of POPULAR AVIATION died suddenly at Oakland, Calif., Aug. 19th.

Speed and super-speed are matters of violent argument at every airport especially in Germany where the rocket fever rages.

EVERY now and then, at the numerous airports throughout the country, we hear youngsters in the flying game naming 1,500 to 2,000 m. p. h. as the speed of airplanes some years hence.

These same youngsters and a lot of others who should have more sense, use the time-worn phrase, "the only excuse for aviation is its speed", to back up their arguments. In the language of some famous poet, "that's a lot of baloney". Commercial aviation will never carry passengers at more than two-hundred and fifty miles per hour and you can dunk your pretzel in that.

Now, let's take the different angles of the case and work them out. First, we have the little proposition of upkeep. We'll say just for the sake of argument that a fair speed for commercial ships is 150 m. p. h. From actual costs of upkeep on the equipment of a certain line operating on the Pacific Coast, we find that for each 25 m. p. h. of speed added to their schedule, they increased their upkeep 30 percent.

Now, some of you palookas are going to ask me why, and here's the answer. Motors go to pieces faster. Wing covering deteriorates faster and tires wear much quicker. Add to this, the ravage caused by vibration (and you have plenty of this at high speed) and you can easily see how large a pocketbook it would take to pay off.

VIBRATION in an airplane causes more trouble than any other known factor. Its actions are never visible to the eye, or nearly never, but the results are quite visible in the way of crack-ups. This curse of the flying game causes metal fatigue and excessive wood deterioration.

Metal fatigue is the baby that causes steel props to separate themselves into numerous pieces while the ship is in the air.

Now, we'll drop the upkeep business and look at another side of the question—passengers. The passenger is the party that will have to pay for the advancement of aviation, but—can they fly him at great speeds and still have the passenger retain his health. Doctors will tell you "no". They claim, and this is backed up by physical examinations during the World War, that only two out of each ten people can stand a speed greater than 300 m. p. h.

Would it be good business to land one of these fast ships on an airport with a dead passenger? Nay, nay, my child, and I furthermore have many doubts as to the passengers' insurance. Insurance companies still have one eye closed so far as aviation is concerned and when a commercial line starts high speed stuff, both their optics will close and close tight.

Speed flyers will tell you that they have certain things to do on fast turns. Some of them scream at the top of their voices. Others stretch the muscles of the body. Each and everyone of them have some little thing to do to overcome "blanking-out", but the blanking-out process takes place just the same—sometimes.

When you hear of a fast flyer cracking-up you can, nine times out of ten, charge his death to this cause. With flying experts being washed out by these shortcomings of the human body, what chance do you think a passenger would have? I'll answer it for you. Just about as much chance as the cat with the tallow legs had of catching that asbestos rat in Hades.

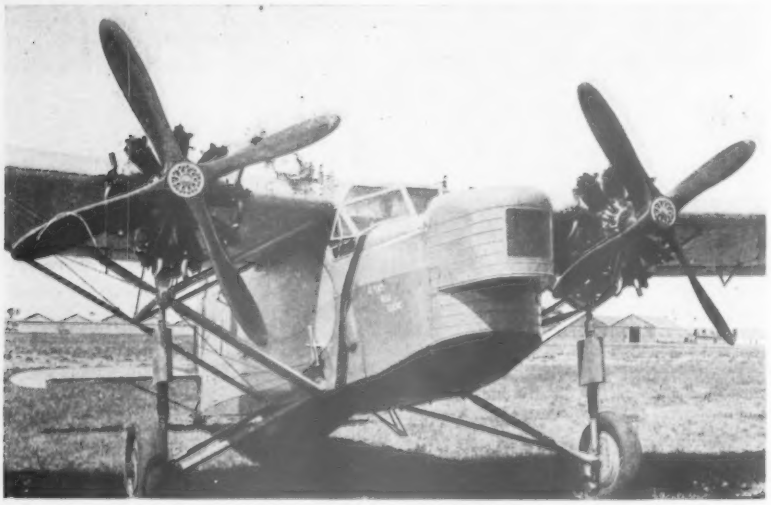
Racing planes such as the above machine, or military planes, are the only type in which low landing speeds can be logically sacrificed.

NOW, for the old time-worn argument about speed being the only thing that aviation has to offer. This is true in a certain sense, but it does not go far enough. Did you ever see a train travel as fast as an airplane? No? Well what else can travel 250 m. p. h.

with the safety of an airplane? Nothing. Right you are—nothing and lots of it.

Then it seems that for the present we have attained a high enough rate of speed for the present factor of safety of our planes. Airplane manufacturers and aero engineers will have to go to work and increase this factor of safety of our ships before they add more speed. The mere fact that human beings can go into the air and fly at a greater speed than a bird is plenty excuse for the grand old game—aviation. Laugh that off, some of you arguflers. If 250 m. p. h. is not fast enough to give aviation its place in the sun, then we may as well go back to bicycles.

When this cry for speed and more speed has finally driven plane builders to create 20 passenger jobs that will make extremely high speeds, then and only then will they realize that their efforts have been just wasted time. They may not realize it then—not until they bring in several stiff passengers, and become tangled up in several million dollars worth of lawsuits.



Developments along the lines indicated by the Caproni ship above, with its economical operation and great speed range, are what Purcell considers necessary.

This old body of ours was just made to travel so fast and no faster and when we park it in a ship that is built to travel, 350, 400 or 450 m. p. h., we slap Lady Luck rick square on the nose. Even at 200 m. p. h. on our present ships, a wise pilot cuts the gun before touching a control. A sharp turn at this rate of speed might cause him serious trouble. Ninety-nine times out of a hundred his body is practically perfect, but—and there always remains that "but."

When Mr. or Mrs. Passenger gets a taste of this speed, they will probably go back to railroads and aviation will have to go through another siege of starvation to wean the passenger back to the air. Uncle Sam used his head when he stayed out of those speed races. A pilot is an asset to the country, so why kill them off?

THESE "readers of the future" who speak of 1,500 to 2,000 m. p. h. in the stratosphere have not taken into consideration several factors that will result. Two thousand miles an hour in the stratosphere? Yes, when cows wear pants! Just because some cloud cleaver gets that high in a balloon is no reason why the rest of us have to go up there and travel that fast.

Would some kind soul tell me what they are going to build this super-plane of and who's going to build it? They could use a cream puff for wings just about as well as they could any of our present plane-building material. It's cold up in the stratosphere—at least that's what they tell me—but passengers traveling 2,000 m. p. h. would be very much put out by the heat when landing. When you have this much speed and then descend to dense air you have enough heat to cook a passenger to a nice shade of brown. Why? Simple. When you have surface on a ship you have friction, when you add speed you have heat—the more speed the more heat.

Instead of playing around with this speed stuff, our engineers should try to give us a ship, with a twenty mile landing speed, a 200 m. p. h. cruising speed and about fifteen hundred pounds of pay load on a single engine. That's what a lot of us would call real progress. This ship can be and will be built some day.

When it is finally built we will end deaths in the flying game. This kind of a ship could be landed on a city street without killing one of the occupants. It could be landed in any mountainous country in the same way.

Aviation needs factors of safety much more than speed. It needs ship and engine improvements and lots of them. It needs some way of making airports visible through several thousand feet of fog. It needs a good mechanical device to fly a ship blind.

SEVERAL mechanical pilots are in the offing today but most of the inventors are strapped for money. It seems to me there should be some way

(*Continued on page* 258)

Bang-Bang-Bang!

Sauvant's machine after being dropped from the cliffs.

SEVERAL months ago, we published a picture of Albert Sauvant's crash-proof plane. He claimed that it was proof against any ordinary crash, but the French authorities prohibited a flight demonstration of its abilities.

Undaunted, however, Sauvant was determined to pull off some sort of a test, even though denied a flight test, and thereupon resolved to drop it from a hill, cliff or mountain if he could not drop it as it was originally intended to be dropped.

The picture shows the result of a fall from a 60-foot cliff at Escragnolles in the French Riviera. After this fall Sauvant stepped triumphantly out of the wreckage uninjured. The body carries powerful shock absorbers across its length and width.

Presidential Nominee Flies to Convention

GOVERNOR ROOSEVELT, Democratic nominee for President, flew from New York to the Convention in Chicago.

He is shown disembarking at the Chicago Municipal Airport. If elected, we trust that this interest in aviation will continue.

Safer Flying Through Fog

WHEN an instrument invented by Charles W. Kiesel, an inspector of the Board of Water Supply, Honolulu, T. H., comes into general use, flying through fog and clouds may be made safer.

Mr. Kiesel's device takes the place of a turn-and-bank-indicator and an artificial horizon. It has been tried on military airplanes in Hawaii, during the primary stages of its development, but not since its perfection. It is known as a "balometer".

At first glance, the balometer looks somewhat like an automobile speedometer. A needle points vertically at zero with a graduated scale to both right and left through 90 degrees. Below this scale is a rotating cylinder set in the face of the balometer like the device which adds up the mileage on a speedometer. Zero on this cylinder is the horizon line.

Mr. Kiesel began his work on the balometer shortly after the Dole flight. He had spent many years of experimental work on machinery used in the sugar cane industry and, being mechanically inclined, believed he could make flying safer. He was convinced, after talking to Arthur Goebel and Martin Jensen, that the unsuccessful fliers in the Dole race lost out because of inability to fly blind.

His first efforts were tested unofficially on Army airplanes, but the instrument was returned to him with the advice that he would have to eliminate oscillation of the turn-and-bank-needle or swinging of the needle because of centrifugal motion. His second device failed to accomplish this. He continued his work and recently perfected his third balometer, for which a patent has been sought.

In this device, the artificial horizon cylinder and the turn-and-bank-needle are attached to diamond-shaped plumb bobs which are set in a compartment packed with glycerine. The bob has to cut its way through the glycerine when the device registers. This retards its motion and prevents oscillation of the needle. The scale on which the turn-and-bank-needle registers, is colored red on the starboard side and green on the port side.

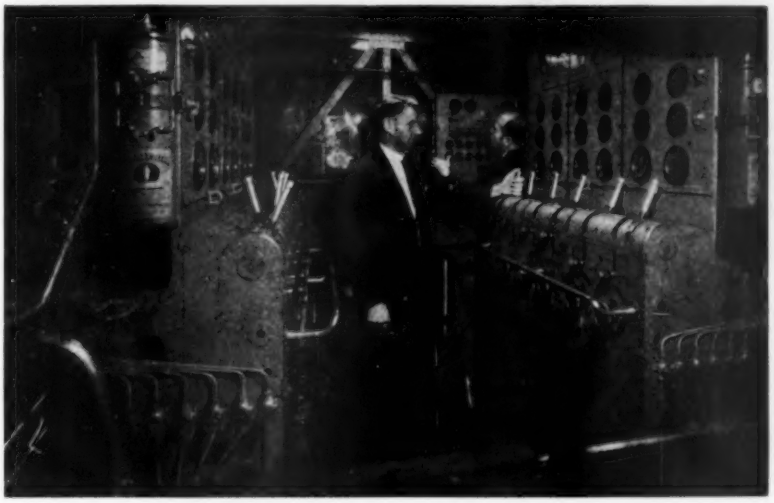
The horizon cylinder is colored also, so that the color will tell the aviator whether he is diving or climbing. That part above the horizon is colored red, and the part below green.

Six States Have No Air Mail Service

NOW there is direct air mail service to 160 cities in forty-two states and direct or connecting passenger plane service to 194 cities.

The six states not served directly by the air mail are those small in area which are close to the large Atlantic Coast airports such as Boston, New York, Philadelphia and Washington, where there is no delay in trans-shipping mail from plane to trains.

Control Methods Vary with Size of Plane



Engineer at the control panels of the DOX.

IT'S a long step from controlling a light plane to the multitudinous gadgets required for handling a multi-engined flying hotel of the DOX type.

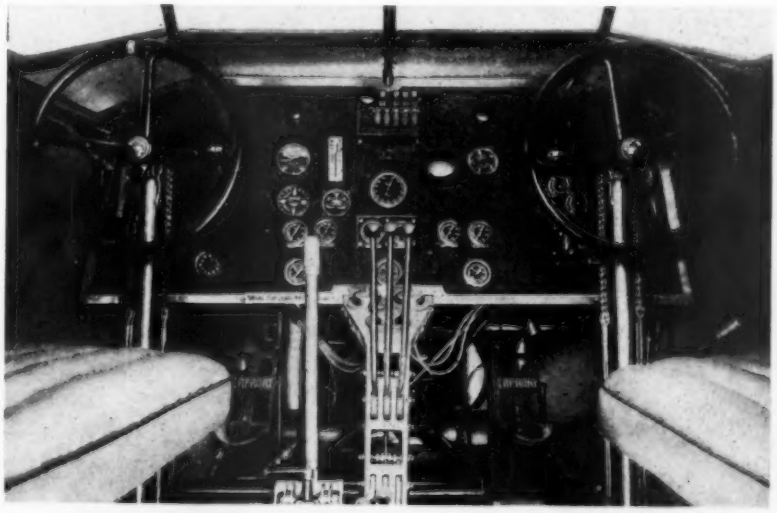
In the small ship we have the "stick" or wheel and rudder for flight control, a throttle lever and a few instruments on the dash. That's all there is to it. But when we have from three to twelve engines to handle, and have to fly a ship weighing ten tons and upwards, then the picture changes.

And just to show what happens when the ship is changed from boy's size to man's size we print the accompanying pictures. The cockpit, the "control room" of the smaller transport plane, has been displayed so many times in these columns under different guises that a description seems rather superfluous—but in the case of the large control matters are different.

The upper picture shows the control room of the DOX, a late visitor to this country. The apparatus much resembles a "remote-control" electrical switchboard in a large power-house and the method of operating it is much the same.

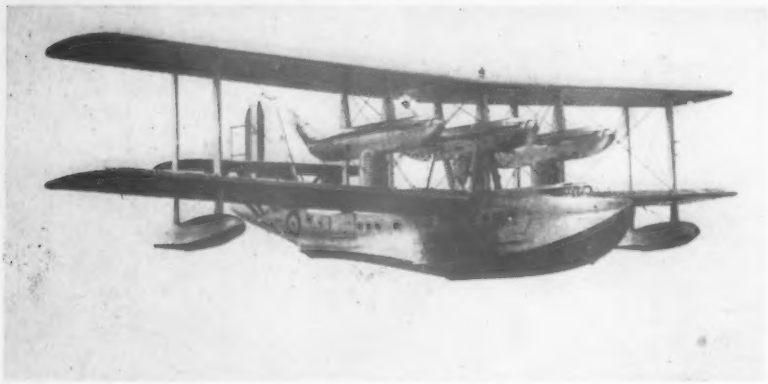
The control panels are divided into right and left groups—for the engine groups on the right and left wing sections. Each of these two groups are then divided into three panels—two engine positions per panel. Thus, all controls for each of the twelve engines are clearly visible and easily accessible.

By looking at the various instruments, the behavior of any one of the power plants can be quickly determined and corrections are then made to their speed or pulling effort by the short handles shown above the counter. The engineer is shown making a speed correction to the last power plant on the right-hand bank.



Showing the simple dual controls of a medium size transport plane.

Britain Builds a Huge Flying Boat

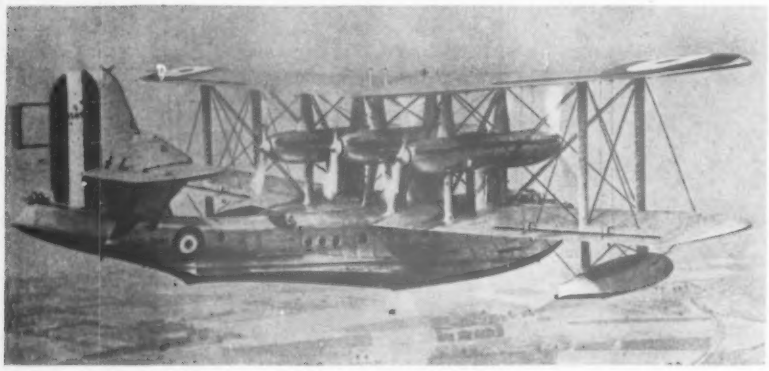


Front elevation of monster British flying boat showing forward engines.

WE SHOW here one of the huge flying boats constructed during Great Britain's "bigger-and-better boat" program.

This is a six engined short military flying boat built at the Short Brothers Seaplane Works, Rochester, England.

It has a span of 120 feet, is over 89 feet long and weighs 70,000 pounds. It is so large that it was launched in a slipway just like other large marine craft. The boat-like engine nacelles are quite unusual and are mounted on turrets of a peculiar design.



Rear elevation of British flying boat showing after engines and tail group arrangement.

Aircraft That Have Duration Records

THE veteran Graf Zeppelin has just completed her 250th flight with a voyage around the borders of Switzerland, thereby setting a record that will not soon be duplicated by a dirigible.

Her journeyings have taken her through 261,000 air miles in 4,200 hours of flying and she has transported 16,000 persons, 13 tons of mail and 33 tons of air freight.

Airplanes are hanging up more enviable records for long service. Lieut. Lefolcalvez, French owner of a 100-horsepower Gypsy Moth two-seater biplane, landed the other day at Stag Lane airdrome in England. He had brought his machine and engine for overhaul by the makers after flying the plane for 610 hours—about 50,000 miles—without repairing nor replacing a part and without giving the engine even a "top" overhaul. In the course of this flying the owner had made 3,800 landings.

A short time ago, a propeller from the center engine of the City of Columbus, flagship of the Transcontinental Air Transport line, was presented to Gen. W. W. Atterbury, president of the Pennsylvania railroad. They inaugurated the air-rail service in 1929 and later merged with the Western Air Express. The propeller had 2,500 hours in the air and traveled 277,281 miles.

A Ford tri-motor, 4-AT, No. 3, has just completed 400,000 miles of air travel for the airplane division of the Ford Motor company. It was placed in operation on the company's freight service between Dearborn, Mich. and Lansing, Ill., on Dec. 14, 1926, and also has been operated to Chicago, Cleveland and Buffalo. It has carried about 6,000,000 pounds of freight. When manufacture was discontinued on the Wright J-4 engines, with which it originally was equipped, three J-5s were installed.

Photo Phans Club

WE HAVE had a very good response from our members who have sent us photographs for publication. Some of the photos were very good and will be published, but others were either in bad condition so that engravings could not be made from them or else they were commonplace pictures that are in general circulation.

Remember, POPULAR AVIATION stands ready to pay $1.50 each for every picture published, and we will run them as often as possible. By "photograph" we mean the original photograph and not a clipping from a magazine or newspaper. It is almost impossible to get good reproductions from clippings.

And now for the new members whom we welcome into our midst. All of them are open for correspondence on the subject of airplane photos.

Earl E. Schultz, 2828 Palmer St., Chicago, Ill., wants to swap aviation pictures. He does not say what kind, but we assume that this covers all descriptions of photos.

Louis F. Karkos, 1422 Liverpool St., N. S. Pittsburgh, Pa., would like to trade any type of plane pictures for photos of the Boeing Experimental Pursuit Monoplane.

Clifford Johnson, 1330 London Road, Duluth, Minn., wishes to enter the club—so here he is. He would like to hear from the members and would like to buy or trade airplane photos.

Manfred E. Huffman, Jr., 650 W. 173d St., New York City, says that he has several photographs taken by the U. S. Signal Corps, one of the most interesting showing a German Hanovarian plane standing on its nose. It had been shot down by a Yankee who was formerly a duck hunter, but who had gone in for bigger game during the war.

Frederic J. Clarke, 1171 St. Catherine St., West, Montreal, Quebec, Canada, not only sends in his request for membership but also sends in an excellent design for a Photo Phans club emblem to be used as a pin. He has a number of interesting wartime photos which he will swap for other wartime pictures. No moderns.

Humphrey Keorl, Laketown, Utah, has several pictures (116 size) of a DeHavilland mailplane warming up and also photos of many old time pilots, Henry Collison, Paul Scott, Lester F. Bishop, E. Hamilton Lee, Henry Boonstra, Jack Sharpnack and others. He will sell these pictures or trade them for a model of any modern plane. He would be glad to hear from the Phans or lightplane builders.

Donald McCash and Henry Martin, both of 931 Scott St., Palo Alto, Calif., have a good start on an airplane photo collection, but wish to enlarge it. They will sell, trade or exchange lists with other members.

Nicholas Franchot, Paul Smith's P. O., N. Y., has a very large collection of warplane photos. He has many photos from the English Air Ministry.

Famous Parachute Jumps

by ROLLIN H. WAMPLER

Notable parachute records of various sorts that have taken place in the past are cited and discussed by a student of parachuting.

PARACHUTE records are being made and broken almost every day. A list of such records is not only extremely difficult to keep up to date, but is also hard to obtain in the first place. Many records which are made are very difficult to verify. There is no agency which attempts to keep such a list.

Measurement of jumps requires unusual equipment which adds to the difficulty of compiling a list. Knowledge of past records is very fragmentary, little of it being written or proven. We shall, therefore, have to be content with recounting a few of the most unusual records of the past few years with no assurance that they are absolutely accurate.

To begin with, there are many different kinds of parachute records. One class includes those made during the daytime; another, those made at night. Some aim at high altitude and others at low altitude.

There are records for the slowest and fastest descents, records for jumps with the greatest number of parachutes, records for the least time for several parachutists to jump from the same plane, records for delayed or free-fall jumps, records for the longest time in the air at a single jump and records for the number of jumps a parachutist has made.

In addition to all these, there are further divisions of men's records and women's records! Considering the difficulty of verifying such records it is not to be wondered that information on record jumps is hard to get.

The altitude record before 1900 was probably around two miles. Today's records of five miles and more are known. One of the altitude records was made at Kansas City, Missouri, on November 1, 1921. The jump was made by Sergeant Encil Chambers, Oklahoma, at the American Legion flying meet. Both the jumper and the pilot used specially constructed costumes and oxygen apparatus. At 26,000 feet Chambers abandoned himself to gravity. He landed about half an hour later. Captain A. W. Stevens, of the Army, jumped from 25,640 feet—practically five miles.

On March 23, 1921, Lieutenant Hamilton was taken aloft at Chanute Field, Illinois. At 24,400 feet Hamilton jumped and immediately pulled the rip cord. The pilot of the plane flew eight miles back to Chanute, boarded another plane and flew back to where he had released Hamilton. He landed just as Hamilton hit the sod.

Other high records are 24,200 feet, made by Captain A. W. Stevens; 22,000 feet, made by Sergeant Dewey Webb, and 21,500 feet made by Eugene Conrad in 1925. In this last descent, the parachutist remained in the air twenty-five minutes.

Dropping earthward like a plummet, the jumper with his right hand is about to pull the ring that releases his chute.

A NUMBER of records for low jumps are claimed. Walter Lees and Fred C. Nelson, both members of the Caterpillar Club, claim jumps of 150 feet. Such jumps are especially hazardous because ordinarily it is unsafe to jump at an altitude of less than 300 feet. Lower altitudes do not give the parachute time to properly open and check the fall.

There is on record one case of where a man jumped with a parachute from a high girder inside a balloon hangar. He lived to tell of his experience.

A most unsual parachute jump was made by Henry Bushmeyer, a parachute instructor at Roosevelt Field. He jumped from 7,500 feet and did not use his umbrella until the earth was 1,500 feet beneath him. During this jump he carried a microphone, through which he broadcast his sensations as the earth came rushing up to meet him.

The microphone was connected with a spool of fine copper wire on the plane. This wire served as his aerial for broadcasting and also as a telephone line for carrying his voice to the talking picture machines. Similar records of jumps delayed for 1,800, 3,500, 2,800, 3,100 and 4,400 feet are known.

A high altitude record for women of 15,200 feet was made by Miss Phoebe Fairgrove in 1921.

Sergeant Moore of the Army Air Corps lays claim to the record for slowest rate of descent. In 1928 he abandoned a plane at 2,000 feet. He was caught by a miniature cyclone and forced upward. Twenty minutes after leaving the plane he grounded safely.

Elbert Brooks, Lambert-St. Louis Field, has made 2,665 jumps during his lifetime. He was injured only once and then not seriously.

SYLVIA BOYDEN, of England, is thought by many to be the first woman to become a professional parachutist from airplanes. At first she used the Guardian Angel type of chute. This chute, it will be remembered, was adopted by the British Army officials in 1918 and is of the "attached" type. Writing of her experience with the Guardian Angel chute, she says:

"However much one may be suited temperamentally for such work, jumping is always an ordeal. From the moment I am fastened in my harness and seated in the airplane, I feel nervous.

"Getting away from an airplane is more difficult than getting away from a balloon. In the first place, to carry a chute in an airplane, it must be packed in a container and stowed. The parachute being out of sight, so to speak, there is no opportunity of inspecting it before leaping, as there is when jumping from a balloon.

"All my jumps have been made with a Guardian Angel, the first practical airplane chute and the only one used by the English Air Force. By a simple means, this parachute is compelled to open. . . Entanglement of cords is impossible.

"My pilot steers the machine to the place in the air from which he considers I should jump so as to land in the airdrome. Then he turns around and asks by gestures if I am ready.

"I get out, legs first, and holding like grim death to one of the struts, sit on the side of the fuselage exposed to the full blast of the wind.

"Sometimes I have felt like crawling back into the comparative safety of the fuselage, but when I consider that every safe jump contributes a chapter to the gospel of making life-saving parachutes compulsory, I brush away my qualms and eagerly await the pilot's signal—'Go!'"

CATERPILLAR SEIVERS, mail pilot on the Pittsburgh-Cleveland airline, found on October 21, 1929, that

he was in a disabled plane. He picked up a mail sack, tucked it under his arm, and jumped at 1,000 feet.

Miss Mrytle Jarboe made a parachute jump at Toledo, Ohio, on August 14, 1927. Her parents, divorced twenty years before, heard that such a jump was to be made. They were present on the field. As Myrtle floated towards the green sod her parents rushed from different parts of the field to congratulate her. Upon meeting again at the occasion of their daughter's jump they were remarried.

An Australian parachutist jumped from a plane over Bandy Beach near Sydney. He was carried out over the ocean and he soon found himself floundering in what seemed to be a playground for sharks. Several hours later he was rescued, little the worse for the scare.

In 1929, Chief Petty Officer Alva Starr of the Navy jumped 2,000 feet from a Navy plane over the ocean. As he descended he inflated a rubber life raft. On reaching the water he rowed his little boat to a waiting submarine.

On November 8, 1929, Charles Broadwick, inventor of a planechute, witnessed a trial of his invention. M. J. McKeon, of San Matro, California, piloted the test plane. The test was made with an old mailplane. There were two planechutes, one at each end of the upper wing. The idea was that a pilot could use such a device to descend almost vertically should occasion demand.

McKeon climbed to an altitude of a mile and pulled the release cords. The right chute failed to open, causing serious disturbance of the balance of the plane. The hapless plane began a flat spin. The opened parachute twisted and began to envelop the plane. McKeon was trapped in the cockpit. The silk life-saver was fast becoming a monstrous destroyer. But McKeon fought like a wildcat.

THE crowd below saw with horror the swift descent of the plane that seemed bent on becoming the funeral pyre of the trapped pilot. At 1,500 feet a figure crawled out on the wing, and, as if by a vengeful monster, was flung into space. At 500 feet he found his rip cord and gave it a frantic yank.

But his troubles were far from over. The pilotless plane was now slowly spinning down directly above him as if determined to crush him when he landed. McKeon pulled on the shrouds with all his strength. A slight breeze blew him away from beneath the plane. He and the plane landed within a hundred feet of each other. Pilot McKeon became a Caterpillar by that jump.

W. B. Bottomfield has made a quintuple parachute jump on several occasions. He carried five chutes in a basket-like arrangement above his head. After the first chute opened, he would cut it loose and drop until his second opened. He would then cut this chute loose and drop until his third chute opened, and so on. With the fifth he would float down to earth.

He first performed this feat at St. Paul, Minnesota, on August 21, 1921. At San Antonio, Texas, he repeated the feat, this time using six chutes. The first five failed to open and spectators feared they were about to witness a tragedy. But the sixth chute, a Service pack, saved his life. He was made a Caterpillar.

On May 30, 1913, Arthur Lapham ascended in a plane piloted by H. B. Brown, intending to jump at an altitude of 5,000 feet. About 300 feet off the ground he accidentally fell off the plane. His chute did not open. He landed in a bog of a salt marsh meadow near Prince's Bay. He was uninjured, but was buried up to the shoulders in mud and had to be dug out.

THE high altitude record for ballooning remained at 35,424 feet from 1901 to 1927. This record has been made by two German balloonists.

Captain Gray, of the United States Army, was determined to break this record. He made a detailed study of balloon aeronautics and experimented extensively before making an attempt to break the record.

On May 4, 1927, he prepared to ascend. At 1:33 P. M. he had just been released from the ground. At 500 feet he released a part of his ballast.

At 25,000 feet his airplane escort was forced to descend because of the thin air. He released more ballast. Continuing in Captain Gray's own words:

"After pulling all the ballast knobs, my ascent began to slow down. At 40,000 feet I walked around the basket, shaking each sand-bag to see that it was empty. One or two had not opened properly when the strings were pulled. I wanted that extra thousand feet badly.

"Movement was quite difficult. It became a question of what could be dropped overboard with the least effort. I decided on the oxygen cylinder that had been supplying gas all the way up. It was necessary to remove the reducing valve and gauges to the next cylinder. My gloves were too clumsy for the work, so I removed the right one, and, peculiarly, suffered no discomfort from cold.

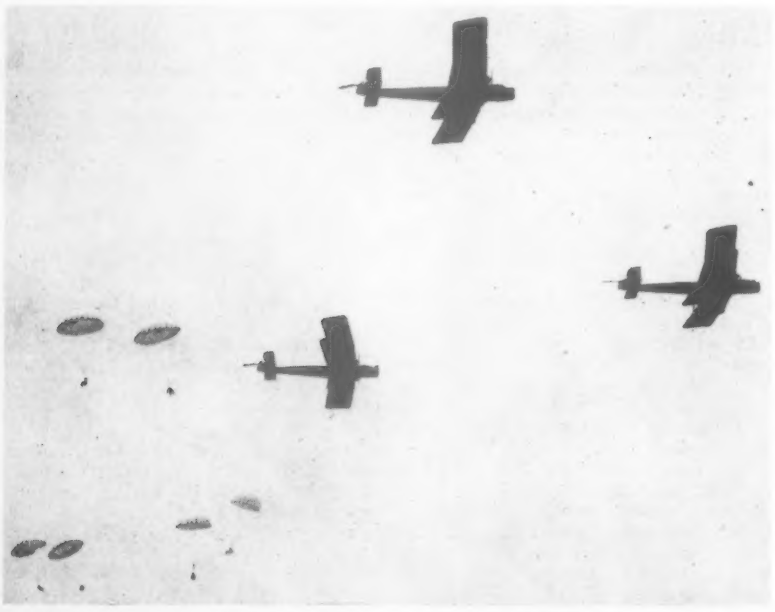
"The iron wrench for loosening the valve nut was covered with frost, as were cylinders, valves and pipes. The rubber hose was frozen stiff. After accomplishing the tremendous job of hoisting the twenty-pound cylinder overside and attaching it to a small parachute, I watched them go down together. The chute opened perfectly. Both were later returned to Scott Field by the gentleman who found them."

Slowly the balloon went up. At 42,470 feet the balloon could go no higher. Captain Gray now had to open the valve which released gas and allowed him to descend. Movement was very painful. Finally, he was able to open the valve. Soon he found that he was descending too rapidly for safety. He discarded everything he could in order to check the fall.

The pace of the balloon scarcely slackened. At 8,000 feet he jumped in a parachute and landed safely. He was a Caterpillar when he landed. His altitude record was not recognized, however, because of a technicality; namely, that he had not landed in possession of his instruments.

EVERY jump is unique in at least some feature. Sergeant Atherton, of the United States Marine Corps, says of his first jump:

(*Continued on page* 269)



A sextet of chutes have just been released from the three planes shown. Two men have jumped simultaneously from each plane at the British Army maneuvers.

"Stalling" and Air Accidents

ANALYSIS, by a French military pilot, of the causes of accidents to airplanes in the subsidized French air transport companies and the French land air forces during the last nine years, provides notable evidence of the importance of work done in Great Britain to eliminate dangers arising from the "stall," or loss of flying speed.

No less than 38.2 per cent of the accidents examined into are attributed to stalling and forced landings. Frequently, the stall was entirely the fault of the pilot, making all the more essential a means of retaining full control even after flying speed has been lost. Without adequate control, an airplane in the stalled attitude will dip one wing and begin to spin rapidly downwards. Such a maneuver, begun at a low height, is certain to end in a bad crash.

Handley Page wing slots, the clever device now standard equipment on 80 per cent of all machines flown in the Royal Air Force and on many private and commercial craft all over the world, were introduced in the belief that the man could not fairly be blamed for accidents which were serious because of a lack of adequate control of the airplane.

These slots are winglets which, in normal flight, fit snugly along the leading edges of the main planes. As the plane approaches the stalled attitude, with the nose up and the tail down, these winglets open thus leaving a gap between themselves and the main wings. The gap has the curious effect of preserving an unbroken air flow over the wings, and control is retained. Without the slots, the air flow would break up and the wings lose practically all lifting power at once.

Years of experiment have produced slot devices which work automatically without any intervention by the pilot. Tests innumerable have shown that a pilot retains full control of a slotted airplane after it has stalled.

And slots have many other advantages. They make possible a safe and steep climb out of a restricted space and make it far easier to land in one, for the angle of descent or ascent may safely be increased much beyond that possible with most unslotted machines. Further, slots give added ease of maneuver in aerial combat and facilitate mass aerial evolutions by large groups of machines.

R-100 Meets End

THE great British airship, R-100, sister ship to the R-101 which collapsed over France in a trip to India, was completely destroyed, smashed up and sold as junk.

The great aluminum girders, which enclosed the balloons, were removed and crushed under a steam roller before being cut into pieces of suitable length. The dismantling occupied six weeks, and signifies the abandonment of the lighter-than-air idea.

The Farman Stratospheric Plane

At right: Side view of Farman Stratospheric plane. Below: Outside instrument panel for air measurement.

AFTER many months of work, the Farman stratospheric plane has been completed and given its initial low-level tests at Toussus-le-Noble, France. The attempt at reaching the stratosphere, 50,000 feet above sea level, will be made shortly.

Farman stratospheric plane in flight.

Because of the rarity of the atmosphere at this high altitude, many changes have been made necessary. For example, the size of the radiator is enormously increased, and as shown in the side view, the radiator occupies a considerable portion of the fuselage side area.

A Farman 300 h.p. engine is geared down to a variable pitch propeller, and the mixture is supplied to the engine by a three-stage supercharger. The engine is of the inverted liquid-cooled type so that it can be completely enclosed within the fuselage.

As with other stratospheric planes, the pilot and observer are completely enclosed within an air-tight cabin and are supplied with ogygen for breathing.

The area of the wings is 70 square meters (728 square feet) and it is loaded approximately to 7.8 pounds per square foot.

The arrangement of the measuring instruments required for this exploration is peculiar. Twenty of the meters are located in a streamline box mounted on one of the inclined wing struts,

Monster British Troop Carrier

DESIGNED to meet its own peculiar problems in its Far East possessions, Great Britain has developed a colossal troop carrier known as the Gloster Bomber-Transport.

This giant among bombers can carry thirty men with their baggage and equipment for several hundred miles at a greater speed than ordinarily attained by such large machines.

It is a biplane provided with Handley-Page wing slots along the entering edge of the upper wing.

Compare the size of the man at the landing wheel with the size of the ship.

Broadcasting Weather Information

A NEW system of broadcasting weather information to aviators in flight along the Federal airways has been introduced by the Aeronautics Branch of the Commerce Department.

As a step toward simplification of the hourly broadcasts, the continental area of the United States has been divided into three chains, known as the red, yellow and blue. The red chain will broadcast on the hour and five minutes after the hour; the yellow chain at 10 and 15 minutes after the hour and the blue at 50 and 55 minutes after the hour.

The uniformity of the new system will aid the pilot in keeping on the airway regardless of existing weather conditions. When it becomes necessary for the weather stations to broadcast a message to a plane in flight, the pilot is called by radio-telephone and instructed to tune in on the special emergency frequency. The emergency message then is broadcast to him without further interruption to the beacon service.

If a pilot desires the radio range beacon signals for emergency use during the period scheduled for broadcast, he may ask for the special emergency service. In this case the weather report is broadcast on the emergency wave length, leaving the regular broadcasts undisturbed. To assure the pilots of only the very latest weather information, all messages are based on reports collected during a period of not to exceed eight minutes prior to the broadcast.

This is an exceedingly important development in radio range finding and beacon service which requires a rather elaborate timing system for making the broadcasts.

Aeronautical · Oddities ——— by Marinac-
"BOB" McDONOUGH, THRILLING STUNT ARTIST, GAVE UP WING WALKING FOR AUTOMOBILE RACING SO THAT HE COULD GET A THRILL OUT OF IT.
POWER DIVES OF 300 MILES PER HOUR, HAVE BEEN ATTAINED BY BOEING WASP-POWERED PURSUIT AIRPLANES --- HIGHER SPEEDS HAVE BEEN RETARDED DUE TO PROPELLER BLADES OFFERING RESISTANCE —
RUTH ALEXANDER — FLEW FIVE MILES OVER THE EARTH, SETTING A NEW ALTITUDE RECORD FOR WOMEN --- WHILE UNCONSCIOUS.
A MONOPLANE FLEW FOR 84 HOURS WITH A RADIAL-ENGINE AND WITHOUT ANY GASOLINE

Reduces the Gasoline Fire Hazard

IN MANY airports it is the custom to strain the gasoline through chamois skin when pouring it into the tanks. Because of a peculiarity of gasolines, notably their very high electrical resistance, this process often results in disastrous fires—strangely enough, without an open flame in the vicinity of the tank.

The ignition of the gasoline, when poured through chamois skin or similar filtering media, is due to the frictional electricity produced by pouring a fluid insulator through the pores of a dry skin. This frictional electricity in the boundary layers of the fluid frequently acquires a potential sufficiently high to produce a spark and it is the spark that causes the trouble. Many apparently mysterious fires have been caused in this way.

It is also obvious that the swashing of dry gasoline against the sides of the tank when in flight will produce similar high potential electric charges and will also account for the sudden firing of the gasoline in flight. Where the tank is insulated from the frame of the machine by thin strips of insulating material, this ignition is very likely to take place and a disastrous fire will result.

Now, a Chicago firm has recently discovered a means of eliminating this fire hazard by the use of a simple compound which is dissolved in the gasoline. This reduces the electrical insulating value of the gasoline and causes internal short-circuits within the fluid so that the potential can never become high enough to permit the formation of a spark. This compound also combines with any free moisture that may be present, thus preventing freeze-ups in the gasoline lines.

A Tribute to Santos-Dumont

ALBERTO SANTOS-DUMONT died at Sao Paulo, Brazil, on July 24. He contracted a disease in France and it was this illness which caused him to return to South America more than a year ago.

In South America, Santos-Dumont was known as "the father of aviation." He was a contemporary of Orville and Wilbur Wright in early experiments before the invention of the powered airplane.

The international fame of Alberto Santos-Dumont began in 1898, when he constructed a dirigible and flew for the first time from the Jardin D'Acclimation, Paris and it was also Santos-Dumont who made the first flight around the Eiffel Tower. He performed this feat in a low powered, non-rigid airship.

Most of the exploits of this aeronaut took place in France and were performed almost entirely with lighter-than-air craft rather than airplanes. Santos-Dumont gave up flying in 1909.

How Uncle Sam Hunts Bandits

by BART MILTON

Thrilling adventures of the "Skeleton Brigade", a unit of the U. S. Marine Corps, detailed on the dangerous mission of policing Nicaragua against jungle gangsters.

HOUR after hour of painstaking climbing over bad trails and unknown paths in the midst of raging torrents in flood-swept mountain regions. The jungles are so dense that oftentimes a man is forced to cut his way through.

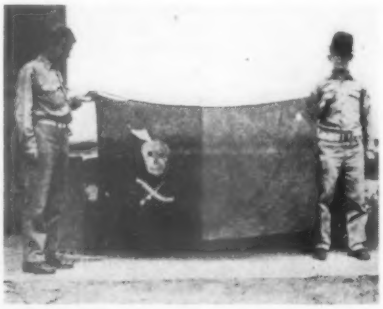
Mile after mile of treacherous march in swampy forests teeming with insects and alligators; week after week of trailing bands of blood-thirsty outlaws of mysterious size and strength—such is the assignment of the "Skeleton Brigade."

The Skeleton Brigade is a little known unit of the U. S. Marine Corps, about 1500 in strength. It is charged with the responsibility of keeping order in Nicaragua in accordance with the treaty between that nation and the United States. The personnel are divided up as officers and advisory instructors in La Guardia Nationale—the standing army of the nation.

These Yankee "devil dogs" have a record unsurpassed in courage and heroism under fire. Their one major job is to wipe out or prevent those periodic reigns of terror that arise from time to time in Nicaragua due to the depredations of numerous outlaw groups.

Although different estimates offer a figure as low as 1,000 and as high as 5,000, exactly the number of bandits in Nicaragua is not known and probably never will be, because of the many mountains and jungles that cover the republic and offer ideal hiding places. These jungle cut-throats, in contrast to the civil populations which is very friendly, have absolutely no respect for human life or property and will steal, burn, maim or murder.

Their favorite method is to collect contributions from the hacienda or ranch owners by attacking in small groups, killing one or more persons, loot the buildings, burn some of them and then quickly disappear in the wooded hills. Within a few days they will sweep down on another hacienda,



Battle flag of the Nicaraguan bandits, captured during a raid.

At the right: One of the Marine Corps planes used in policing Nicaraguan territory. It is one of the most effective weapons yet discovered in the war against bandits.

Below: The ground troops signaling to the planes by strips of white cloth laid on the ground. These letters are visible for a considerable distance.

spreading terror and death. Usually two or three of these killing expeditions in one region makes it possible to extort and levy against the civil populations. It is at such a time that the Guardia, led by the Skeleton Brigade, goes into action.

Some of the outlaw chiefs call themselves "gentlemen bandits." This may mean, as one Marine officer phrases it, that they never hit a lady with their hat on, never torture a prisoner—unless he becomes bothersome—and always give a victim a receipt for his stolen valuables.

The term may refer to the swanky looking caballero. Such is Pedro Altamirano, alias "Pedron." Fastidiously dressed is this tall, swaggering fellow, built like a football player, yet well over 60 years old. Usually he rides a big mule, wears high boots, khaki trousers and woolen khaki shirt. He is especially fond of gold chains and gold rings and always has a high-priced 45 caliber revolver.

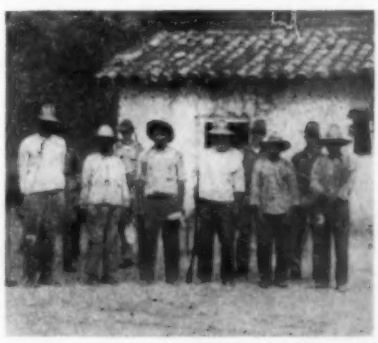
Altamirano takes pride in the fact that virtually all the men in his family have embraced banditry as a profession, this despite the fact that two of his own sons have been killed while trying to outwit the law. He as the swaggering caballero, still roams the Nicaraguan mountains and jungles, particularly in a region known as Pena Blanca, 54 miles from Jinotega. One of these days the Skeleton Brigade will get him.

Two other of the "gentlemen chieftains" upon whom the Brigade have cast interested eyes are Salgado, a savage of great courage who customarily goes barefoot, and Salinas, former member of the Guardia who took French leave some months ago, after some real or imaginary insult. He now assumes the role of roving marauder.

These, and others, are organized groups whose numbers sometimes reach 250. They commonly wear black and red hat-bands. Now and again a skull and crossbones is noted on hats and flags. Occasionally regular uniforms are used, but usually old clothes or garments taken in raids are worn.

In trailing these jungle gangsters, simple but effective are the methods of the Skeleton Brigade. The various "Departments" of Nicaragua, corresponding politically to our states, are divided into "Districts," each being regularly patrolled by one or more companies composed of from 100 to 600 men apiece. The companies in turn are split into smaller units of 30 men or more, depending upon the particular emergency at hand. These go on reconaissance missions, the standard aim of which is to locate and destroy well hidden and well fortified outlaw camps.

These are not easy missions for the Skeleton Brigade, especially when they are generally out-numbered from four to one. Then there is the rainy season



A group of bandits captured by the U. S. Marine Corps.

which usually starts early in May and lasts three months. There are almost continuous downpours with swollen streams of treacherous depth and violence to cross.

In addition to the patrol system, regular mountain lookouts are maintained close to the towns in bandit regions. The average personnel of these observation posts, which consist of a shack equipped with a lookout tower, is only four to sixteen men. In case of emergency, the signal flag is waved by a member of the Brigade calling in others and then, by telegraph, the headquarters of the Unit are notified.

On a certain night recently, two Marine Corps officers and fourteen enlisted natives were present at a mountain lookout station, located on a slope above the town of Quilali. One of the officers, who for personal reasons prefers to be nameless, says that Lieut. Walter C. Smith and himself were in command. One of the enlisted men was ill in bed with malaria.

"At 10 o'clock in the evening," he related, "the dogs in Quilali set up a terrific barking and upon listening intently, what sounded like mounted men could be heard crossing the river just below the village. The two officers, having only twelve effective enlisted men present, didn't deem it wise to venture forth into the darkness but cautioned everyone to be especially on the alert, particularly the two sentries and the corporal of the guard and await developments.

"At fifteen minutes after one o'clock the next morning, a fog bank enveloped the station. The sentry above the barracks detected a movement on the hillside some 25 or 30 yards distant. He challenged. He was answered by a burst of machine gun fire. At the same moment fire was opened on the barracks proper and also the observation tower itself.

"This fire was intense and included two or more automatic weapons, rifle fire and several dynamite bombs. The Guard went instantly to their regular battle stations and returned the fire. The main attacking groups were disposed on three sides of the hill, having worked to within 30 yards of the barracks door before being detected. After employing rifles, rifle grenades and all automatic weapons to the valleys on each side, the attacking parties retreated. The fight lasted about an hour.

"Every individual in camp responded splendid to the emergency without fear or hesitation. There was Lieut. Smith, who, when the heavy Browning machine gun which he was using atop the observation tower, jammed, he immediately, and without regard for his personal safety, descended under fire and ran to the far side of the barracks to secure a Lewis machine gun for replacement. With this weapon he resumed his post atop the tower, sustaining hand burns, but working his Lewis with telling effect to the hill above the barracks.

"Another hero of the engagement was Raso Espinosa, a native member. When the first bandit struck near the door he was acting as corporal of the guard nearby. Immediately he secured a heavy Browning machine gun, unaided, and placed it in a new advantageous position and opened fire in the direct line of fire from the attacking groups.

"This was the first resistance offered. Being immediate, it disconcerted the attackers and occurred before the remainder of the Guard had a chance to spring from their bunks. The sharp and prompt rain of bullets sent out by Espinosa unquestionably prevented the attackers from fulfilling their mission of gaining the summit and entering the barracks under cover of the fog. It also eliminated the element of surprise upon which they had depended."

Working in close touch with the ground patrol men is an efficient force of U. S. Marine planes, flyers and observers. There are some 21 planes, 226 enlisted men and 18 commissioned officers, all being pilots except one. Of the planes, more than half are two-place observation ships with room for a pilot and one observer. There are five amphibians and two transports. The latter are especially useful in hauling ammunition, supplies and they take men to various strategic points.

Daily flights are made and during times of extreme bandit activity, the planes are constantly in the air, assisting the Skeleton Brigade and searching out bandit groups under atmospheric or ground conditions so treacherous at times that a single miscalculation spells disaster if not death.

Staff Sergeant G. W. Heritage, Marine pilot and his mechanic Corporal Simmons, were on a cruise above a dense swamp region when their motor cut out and they were forced to make a crash landing. They were more than 50 miles from their base and sur-

(*Continued on page* 264)

A strange contrast between the ancient ox-cart of the natives and the modern transport plane used for moving troops in Nicaragua.

One of the German Aces

ONE of the best known German air fighters during the World War was Baron von Schleich, called the "Black Knight." Our portrait shows the baron in his "civvies," taken recently in London.

Baron von Schleich, the "Black Knight," smiles amiably in peacetime.

Now, a strange event has taken place. The baron is planning a trans-Atlantic flight with a wartime enemy—Major Christopher Draper of Britain's wartime flying forces. The two former arch enemies intend to wing their way westward together.

18,069 Pilots Have Federal Licenses

THERE were 18,069 pilots and 7,439 aircraft holding active Department of Commence licenses on July 1, 1932. These totals may be compared with those for April 1, 1932, when there were 17,628 licensed pilots and 7,476 licensed aircraft.

Among the 18,069 persons holding pilots' licenses, there were 7,021 of the transport grade, 1,376 limited commercial, 35 industrial pilots and 9,637 licensed in the private classification. The licensed pilots included 520 women, whose licenses were divided as follows: Transport, 53; limited commercial, 46; industrial, 1; and private, 420.

Considering licensed aircraft only, New York led with 987; California followed with 939 and Illinois was third with 483. The greatest number of unlicensed aircraft was in New York, where there were 245; while California had the next greatest number, 223; and Illinois was third with 206.

In number of licensed pilots, California led with 3,497; New York was second with 1,815 and Illinois third with 1,117.

The study also included gliders and glider pilots. It was found that the number of licensed gliders was 81, and unlicensed gliders, 1,227, making a total of 1,308. Licensed glider pilots numbered 261. The greatest number of gliders in a single state was in California where there were 228. New York was second with 130 and Michigan third with 116.

Freak Ice Discovered by Aviator

ICE that disappears in freezing weather, but which does not turn to water, is the latest discovery of Wesley L. Smith, veteran aviator.

Mr. Smith has discovered that ice, which accumulates on a plane climbing through cold, cloudy atmosphere, will slowly disappear by evaporation in clear air above the clouds—even though the temperature is below the freezing point. This is the result of reduced barometric pressure at high altitude, which permits the change-over of the ice from the solid form to vapor without going through the intermediate liquid stage.

This phenomena can be easily duplicated in the laboratory by means of the vacuum air-pump.

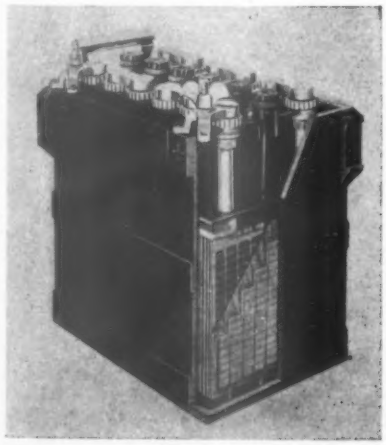
Integral Shielded Non-Spill Battery

SPILLINGS from an airplane storage battery during a loop or wingover has now been completely abolished by the designing and perfection of a non-spill battery. Everyone knows that every battery must have a vent plug because of the chemical action which takes place inside.

In all previous batteries a small hole is bored into the plug and if it is turned over the solution will spill. In this new battery a special vent plug has been invented which will give relief to the chemical action but will not permit spilling.

In addition to this feature other improvements have been made. It is more compact in size without reducing the power or contents, due to the elimination of a double chamber which is made possible by the new style vent plug.

There is also a reduction in weight of about 20%, as the old battery box is eliminated by the installation of a rubber lined metal container. This container also acts as a radio shield and no radio interference can come from the new battery.

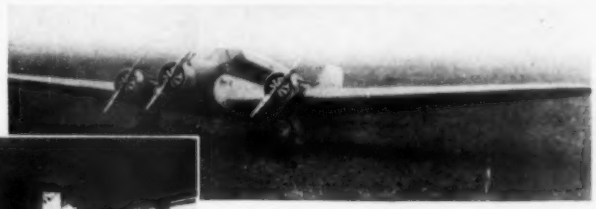


A cut-away view of the new airplane storage battery showing venting.

The "Breda 32," an Interesting Ship

At right: The trimotored "Breda-32", a novel low-wing monoplane.

Below: The Cabin interior shows good visibility and comfortable seating.



EXCEPTIONALLY clean design and many ingenious structural features characterize this machine. The structure is more than usually light owing to the adoption of the "single-spar" system of wing construction, which has been developed by the company, also the unusual method of stiffening the sheet duralumin covering of the wings and fuselage.

Instead of employing normal corrugated metal for this purpose, as do the "Ford" and "Junker" companies, Bredas have adopted a system of their own, which consists of pressing out a number of "blisters" or short interrupted corrugations on the covering metal.

The machine is, as may be seen from the photos, a low-wing monoplane. It has a span of 87 feet 6 inches, giving 914 square feet of area. Landing speed is 57½ m.p.h., cruising speed (at 3,000 feet) is 131 m.p.h., and the highest speed so far attained is 147 m.p.h. The radius at cruising speed is 840 miles.

These figures assume a pay load of 5,940 lbs., i.e., 71 per cent of the loaded weight of the machine. The mounting and cowling of the three "Wasp Junior" motors is obviously the result of a great deal of thought.

The work has been carried out in such a manner as to do away with any lumps or excrescences which would cause drag or cause turbulence in the air-flow.

In addition to this, the forks of the undercarriage on which the wheels and "spats" are carried are cut down as far as possible in length and the "spats" are mounted on the forks so that they move with the wheels. This allows the spats to be carried lower in relation to the wheels than would otherwise be the case and results in better streamlining of the wheels.

Metal propellers, which may be adjusted for pitch while the machine is on the ground, are fitted to the Wasp motors. The wing motors are set at an angle to the line of flight so that their slipstreams impinge on the rudder. This makes for easier steering at low speeds or when one motor is out of order. Another feature of the motor mounting, which is worthy of notice, is the manner in which the wing motors are mounted well in front of the leading edge. This is so that there shall be as little loss of wing efficiency as possible due to the slipstream.

An exceptionally large and well fitted cockpit is provided for the two pilots. The visibility is very good and all instruments and controls are well placed. Provision is also made for an engineer and a radio operator, who will sit in the control cockpit behind the two pilots.

Accommodation is provided for eight passengers on the existing seats, but provision is also made for the fitting of three extra seats in the alleyway between the armchairs. These extra seats may be folded up against the armchairs. All the windows of the cabin are made to open without allowing a draught.

The gasoline tanks are all carried in the wing, well out from the cabin, and are fitted with a dumping valve in order that the pilot may jettison his dangerous fuel in a case of fire or other danger.

Hook-on Trials Conducted with Akron

THE airplanes of the U.S.S. AKRON, operating during the airship's cruise along the Atlantic coast on July 14th, made 104 hook-ons while the six pilots of the detachment took turns hooking on and releasing the training planes.

This was the first operation as a complete unit of the AKRON's heavier-than-air detachment and Lieutenant D. W. Harrigan, commanding the unit, with Lieutenant H. L. Young, put the new pilots through a strenuous day's work, as the airship made a twenty-four hour flight testing the water recovery gear.

This hook-on gear has formed a part of the Akron's equipment for some time, but up until these recent tests, little use was made of the equipment. It is quite a difficult maneuver, requiring hair-breadth control at the instant that the airplane hooks-on.

To hook-on, the airplane must first be slowed down to the Akron's speed.

They Agree With J. B. R.

WHAT is the limit of speed of man-made and man-driven airplanes? At present the world record is 406.9 miles an hour. Physicists of the National Advisory Council for Aeronautics desired to discover the ultimate limit, so they conducted tests in the world's highest speed wind tunnel at Langley Field, Va., in which the air can be made to rush at 800 miles an hour faster than the speed of sound.

A racing airplane wing section of conventional form was experimented with in this air stream and at 600 miles an hour the drag or resistance of the wing to the air increased enormously. The scientists learned thus that it will be almost impossible to supply enough power to the airplane above that speed to drive it through the air.

To the human bodies, the testers found, it is not high speed but changes in speed and direction which are dangerous. It is doubtful if a pilot could stand more than 300 miles an hour on sharp turns.

Another fact of interest which was discovered in these tests is that an airplane traveling at 100 miles an hour has a part of it traveling at 600 miles an hour. This is the tip of its propeller turning 1,800 revolutions per minute. The importance of the propeller in increasing the speed limit was shown by a test in which it was proved that by gearing the propeller so that if it turns over once while the engine turns over twice, the propeller's efficiency is nearly doubled.

Stunting Over the Alps

UDET, the great German war ace and stunt flyer, is shown capering dangerously near the sharp peaks of the Swiss Alps.

He is performing one of his characteristic wing-tip scraping acts for a movie concern during the filming of the photo play, "The White Hell of Pitz Palu."

Playing leap frog with the Alps.

Elmer Sperry, Father of the Robot Gyro

Dr. Elmer Ambrose Sperry, celebrated American inventor, who specialized on the gyroscope.

THE world of invention has never contained more colorful figures than this ingenious good natured group that has done so much to add to the safety of aviation—the modest Sperry family.

When Dr. Elmer Ambrose Sperry died in June, 1930, after fifty years of inventive service to the safety of mankind, it might be assumed the book had been closed.

However, a startling announcement followed the shock of Dr. Sperry's death. Elmer Ambrose Sperry, Jr., had taken to the air to follow on in the dual footsteps of his father and brother. He would be a demonstrator-inventor just as his father before him.

At thirty-five years of age, Ambrose Sperry, Jr. had secured a pilot's license in the record instruction time of three hours. Next followed the news of a six thousand mile test cross country of his robot gyro, sixty-five pounds of metal that operated the controls of a huge Curtiss Condor by simply pressing one of two buttons.

He accepted the successful results of the test in these words of his own style, "It reminded me of my brief experience on the farm where I saw men drive oxen by calling 'Gee' or 'Haw' to them." No clamor nor desire for publicity or photograph to mark the occasion—typical Sperry action was displayed by the younger Sperry.

It was a further perfection of gyro stabilizer with which his brother Lawrence had won first prize in France in 1914 for the most perfect automatically controlled plane.

Mr. Sperry, Sr., was born in Cortland, New York, in 1860, and at the age of twenty founded the Sperry Electric Company in Chicago, to manufacture arc-lamps. This was the time of the transformation from steam trains to electricity; and the then young Sperry followed the trend of the age soon after when he founded the Sperry Electric Railway Company in Cleveland, Ohio, to manufacture electric cars. This business was sold in 1894 to the General Electric Company.

The Sperry mind was inventive rather than business-like, as with his contemporary, Thomas Edison, who also started his career in the midwest. He then turned his face east to Brooklyn, where in 1910 he founded the Sperry Gyroscope Company in that city.

The ever busy Sperry mind, which accounted for 400 patents in the United States, and Europe up to the time of his death, started to work. It produced the gyro-compass, airplane and ship stabilizers of such value in marine circles. The highest intensity searchlight (1½ billion candlepower), a compound internal combustion engine, erection of the highest electric beacon in the world in Chicago, a design of an electric automobile, and a track fault finder were other products of his mind.

Honors were showered upon him from all sides. He was made a member of the Marine Board as chairman of committee on aids to navigation. He received the Franklin medal, Philadelphia, 1915, the Grand Prize for the gyro compass and gyroscope San Francisco Exposition, 1915, Collier trophy for drift set, 1916, Scientific American medal, American Museum of Safety, John Fritz medal, 1927. He was decorated by ex-Czar Nicholas of Russia for navigation equipment and also by the Emperor of Japan.

Safety through stability was what the late Elmer Ambrose Sperry sought to devise, and he applied it through the muscle of the gyroscope. What he left undeveloped will be heard from at the hands of those he endowed generously with his own genious—his two living sons who carry on the work.

Ambrose Sperry, Jr., at the wheel of an old Curtiss "Tripod".

What's the Matter With the Helicopter?

by T. N. deBOBROVSKY

While this is one of the earliest flying machines proposed for the conquest of the air, yet the helicopter has shown little progress during all these years.

THE time is August 24, 1907,—just four hundred and one years since the great Leonardo da Vinci sat on Fiesole, a hill near Florence, and watched the movements of the birds, which his assistant had released. Before him was his sketch book and some empty pages of rough paper. His pen moved across the page and with a few strokes he drew a sketch of his dream—a machine that would fly like a bird.

His assistant looked at the lines on the paper, shook his head in a doubtful manner, as if it were just another phantasy. But the soul of the Great Master was not there. He was gazing at the sky, high above the hills of Florence, and dreamed the day when perhaps he, too, would fly like the birds.

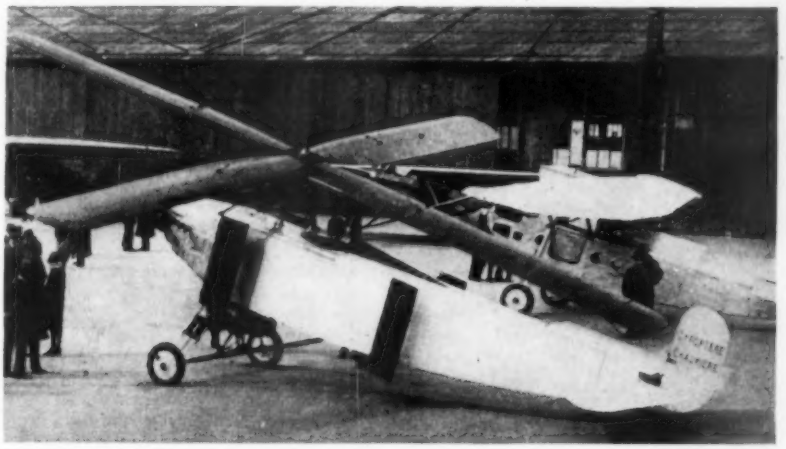
The Master had seen his dream in the sky, his pen worked rapidly and at the end of May, 1506, when he returned to Milan, there was among his drawings a sketch of the first Propeller-Helicopter.

But all was futile, because the Great mind was a few centuries ahead of his age.

Four hundred and one years later, in the town of Douai, France, citizens and mechanics witnessed the first rise of an helicopter, the Breguet-Richet Gyroplane.

A great dream had been realized, but the result was not the same as that which the Master had in mind when he penned that first sketch.

Today, close to the twenty-fifth anniversary of this flight, the hundred or more builders of helicopters have not attained much better results. Why is this? Is the helicopter problem not worth solving? Is it impossible to build a successful helicopter? Thousands of patents have been issued in all different parts of the world, and scientists and amateurs are working to solve the problem. Are they all on the wrong track? This and many other questions are still unanswered on this anniversary.



This Chauviere helicopter has much the appearance of an Autogiro, but its lifting screw is driven directly from the engine.

At the time of the observance of the twenty-fifth anniversary of the first airplane flight, glory in the past and success in the future was the center and watch word. But with the coming of the twenty-fifth anniversary of the brother of the airplane, semi-success, short flights at very low altitude and a doubtful future is all that can be told.

The early dream of daVinci.

If you have an helicopter idea or invention, you will be laughed at and will find it a very difficult matter to get financial aid for research work. Hardly anybody in the scientific field will lend you a helping hand. Just tell someone that you have faith and hope in the future of the helicopter and you will lose a friend.

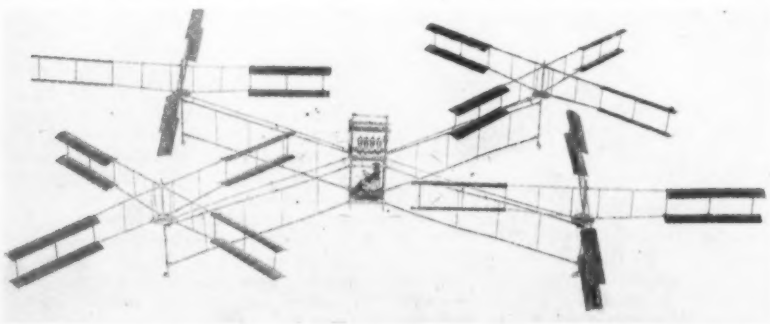
Well, here is a short story of the past.

In the month of April, 1784, two Frenchmen, Launoy and Bienvenu, built the first helicopter model. This was the only one, out of the many other fantastic ideas and designs, that was built and showed any results. The test was viewed by the members of the French Academy of Science, but without any enthusiasm.

That some model is the forerunner of the helicopter model which is copied by the boys of today. Since then many hundreds of models have been made.

A great many artists were among the aviation inventors. Perhaps they were influenced by the fact that Leonardo da Vinci was also an artist. The names of Cornu, a Frenchman, and the Swiss brothers Dufaux, should be mentioned. They built helicopters with gasoline engines, but not big enough to hold a pilot.

These big models climbed vertically and hovered in the air. All the full size helicopters built before or during 1907 were unsuccessful experiments. Here in America, Otto Luyties built one with an eight-cylinder engine. The propellers were 35 feet in diameter at 35 r.p.m. and were driven by a 20 h.p. engine. Before the final tests could



The elaborate helicopter of Breguet-Richet, employing four groups of biplane lifting propellers.

be made, the helicopter was destroyed by a tornado.

The two first full size types for carrying a pilot were the Cornu and the Breguet-Richet. Cornu built his first machine way back in 1905 after he had already tested gasoline engine mounted models. In the spring of 1907, the two Breguet brothers, Louis and Jacob, in association with Professor Richet, started to build an helicopter. The patent was granted on March 11th, 1907.

This machine weighed 1,270 lbs. The motor was a 45 h.p. Antoinette, specially geared for helicopter use. The diameter of the propellers was 24 feet with biplane blades, having a very high aspect ratio.

At the trial test on Aug. 24th it climbed to a height of 8 ft. All further experiments with this helicopter were then abandoned by the inventors, because the motor was found to be inadequate. One year later, 1908, another machine was built. This was the first helicopter to climb to a height of 30 ft.

The Cornu helicopter was tested one month later than the Breguet and its climb was 1 foot. For a time, interest in this type of aircraft waned. It was only in private laboratories that the inventors worked to solve the problem. In 1912, Ellehamer of Denmark built and tested a helicopter, but no special success was obtained.

Far back in 1890, Alexander Svachulay, a scientist in Budapest, began making tests with helicopter models. He worked silently in his laboratory and turned out one model after another, which were driven with all kinds of motors. Some of these have climbed to a height of 300 feet and were stable both in flying and descent.

During the World War, when the loss of captive balloons became too expensive, the Central Powers issued a command that the problem be solved by using helicopters. The inventor, Svachulay, offered one of his patents to the government. After a period of meandering, it finally came out as a "captive helicopter" in 1916.

This was not a free helicopter, but was held to the ground by three steel cables. The name of the inventor was changed and the world knows it as the

The Autogiro is the nearest approach to a practical form of helicopter.

Petroczy-Karman-Zurovecz (P. K. Z.) helicopter. But nevertheless, up to the present day, this was the only one able to climb to a height of 150 feet and hover in the air 30 minutes, carrying the weight equivalent to that of four men.

The government refused to accept it for the reason that it lacked stability. The author is acquainted with all the persons connected with these tests, and the original inventor claims that, if his offer had been accepted directly, he could have assured them a complete success. In other words, the soul of the invention was not given with this offer.

During the World War, every country had its own ideas about research, but without success. Ever since the close of the war, the idea and the advantages of vertical rising and landing has taken a firm hold the minds of men. In France, Prof. Lacom and Damblanc (1920), Cemichen (1920-24), in Spain Pescara (1919), in U. S. A. Berliner (1920-25), Bothezat (1921) and Leinweber, with Curtiss (1920) began to build full size helicopters.

On September 14, 1920, the Lacom-Damblanc helicopter was wrecked during ground trials and no further experiments were attempted. Oemichen's first helicopter was unable to fly, the lift of the propellers not being sufficient. A balloon was attached to the top of the helicopter to give the proper lift. With this arrangement it did rise vertically about 5 feet. After these tests he built a second helicopter, which lifted 30 feet vertically. The maximum duration was 10 min. It also did some closed circuit flying.

Pescara built four helicopters, one of these in 1922, climbed five to 10 feet and made a hovering flight of 5 minutes. The fourth one was tested last winter with the same results.

Berliner also built four helicopters, with no success. The Bothezat helicopter was also built in U. S. A. (1922), assisted by the government. The record flight was one minute, 44 seconds, duration, with about 10 foot altitude. No results were obtained with the Leinweber-Curtiss helicopter.

All hopes of government aid, both here and abroad, were ended when the secret hope of the British Government ended with the failure of the Brennan helicopter. The U. S. A., British, French and Italian fiasco with military helicopters ended the program in that direction.

Not many notable attempts were made in the years following. The Hellesen-Kahn helicopter met with no success and Chauviere's attempt with his autogiro type helicopter was not much better.

There has been a rumor in the air recently that caused us to think that the helicopter problem was about to be solved. In Italy it was D'Ascanio, and over here it was the Curtiss-Bleecker helicopter. The differences between the two were many, but the

(*Continued on page* 268)

Army Aviators Get New Flying Suits

Fitted out with a cold-proof suit.

THEY zip on and they zip off! Uncle Sam's aviators had frequently complained about the old-fashioned "monkey"-suits which were too heavy, unwieldy and only warm when the weather was warm. The monkey-suits now, however, are due to go on the shelf and a new, two-piece design, approved both commercially and officially, is being manufactured to replace them.

Horsehide, less bulky, non-scuffing and lighter than the old calfskin, is used for the outer covering of the new suit. Lamb shearing, after being treated in acid and electrified to straighten the curly wool, is used for the collar and lining, and has proven to be smoother, softer, and less irritating to the skin than the old suit lining material.

Interlocking fasteners of the zipper type are used along the entire length of arms, trouser legs, and jacket fronts, greatly facilitating the donning and removing of the apparel. To prevent air leakage, and penetration of cold, overlapping fur runs along the inside of the seams. By actual test in cold chambers, this over-lap increases the warmth of the garment by ten degrees.

A specially designed collar which fits close, and is held by elastic bands, and heavy elastic suspenders for the trousers, complete the new protection from the cold. The suit has been tested to —40 Centigrade, and found thoroughly satisfactory.

Loitering Along the Aerial Highways

by T-2003

Stopping and chatting here and there with the airminded along his route, our old friend T-2003 unearths some amusing incidents dealing chiefly with conflagrations.

NEAR Oceanside, with a quick fog rolling in from the Pacific, I landed in a field alongside a small open cockpit job. That night I found the pilot in the local hotel and swapped yarns with him.

Yes, I had noticed his newly repaired lower wing tip. Tough luck? Sure, it was, and all on account of a this-and-that so and so who—well, you see it was this way.

"I had taken off from Oakland (such was his story) with this bus I just bought and after a stop at Bakersfield for gas, I came over the hump for a landing at the United Airport at Burbank. As you know, there's a smoke column rising out of a hole in the middle of the asphalted runway which indicates the wind direction. Better than a "T" or the conventional wind-cone by far—unless—well this day just before I came to Burbank, some dopey Ike sees this smoke for the first time. 'Ah,' sez he, 'a fire. The asphalt runway has taken fire.'

"Once when a grass fire threatened a bunch of ships from March Field, the cadets turned tail to blaze, slapped on brakes and stemmed the roaring inferno by the wind blast from whirling props. 'Me, I will save United Airport'.

"So he taxies up to the smoke, turns tail and roars his engine at the column which had been bending East under a brisk West wind, but which now flew North from the windblast of this dummox's ship. I came in, and took the smoke's direction for granted, not attaching special importance to the airplane parked near it.

"The result was that I made a beautiful cross-wind landing which wouldn't bother a guy like you" (he expected flattery to make me more credulous than I normally am) "but me, with a light, high-dihedral job just ooped up and over. One bent prop, one torn wing tip—and one brutalized bozo who thought he was saving United Airport from the Scarlet Fiend—as the saying goes. Did you ever relieve your feelings by busting a guy on the beezer?"

* * *

AT TUCSON, upon registering at the Pioneer Hotel, I learned of the recent death of its former manager, G. H. Benefield, local pilot of note, ex-war bird and one who was foremost in Arizona flying circles. Arizona is no slouch in aviation. In one hangar at the local airport fifteen planes were sheltered, ranging from "Dutch" Shankle's Lockheed Sirius and an American Airways F-10 down to a tiny Aeronca. Something for a town as small as Tucson.

A postmortem being held on a front end blaze.

At the hotel, a fire extinguisher salesman was discussing his wares.

Said he, "I had just installed an elaborate system of fire defense in a large mansion in California. The owner's son, a gay young pilot, had come to see me at his father's estate and discuss fire-proofing the hangar on the grounds. He had landed and was draining the gas from his tank on account of water in the gas, when a spark or something set fire to the stream of gas pouring from the tank.

"There was I, surrounded by a half dozen different gadgets to put out fires but darned if I could get the sticky goo with which you blanket gas fires to stay up around the gas drain hole on the under side of the tank. What I mean, you can't make a blanket of fluid stick to a ceiling. A sixty-dollar a month gardener proved the hero. Setting the nozzle of his garden hose to a fine stream he turned on the water and literally cut the stream of gas in two, chopping off the gas just as soon as it left the tank.

"Of course, I used my goo-fizz on the blaze that had now spread on the ground, but imagine my embarrassment. Since then I've never had the nerve to tell anyone that it's dangerous to use water on a gas fire."

* * *

AT EL PASO we were stormbound for four days. Well, maybe I could have gone on but there was Big Springs 200 miles away and Juarez (across the border) only one mile. At the American Airways field office, a group of the big rudder-and-stick men were waiting one day for the West bound to make it over the Guadalupes. I asked one pilot about a lad he had as co-pilot on another line back in '29. "Scilley? Yeah, that was his name and that was his nature. A big boy in his home town where he's running a newspaper, but as a co-pilot, well—he was just Scilley.

"On the desert run we were then on, we used to pass over a lonely homestead about 50 miles away from the nearest settlement. Every noon, as we passed over the lone nester's shack, the poor cuss would come out and wave a greeting to us. We were his only contact with the outer world. No companions, no civilization, no comforts, no nothing—the lonesome pioneer greeted us as if we were coming down to hold a gabfest with him.

"One day my gay young co-pilot turned to me. 'Let's drop the poor wretch some reading matter.' 'Oke,' sez I, and Scill went back to drop a magazine or two out of the cabin door.

"The next day we were prepared to circle around and drop a bundle of newspapers. This time, however, the homesteader was pumping bullets at us. A fine greeting, so we sped on. The next day his shack was burned down and the place deserted.

" 'And after we did him a favor,' remarked my partner. "Some people show their gratitude in funny ways."

"Say, kid, what magazine did you drop him?"

'A copy of Ranch Sweethearts,' the boy hero answers.

* * *

IT WAS in Dallas that I overheard an interesting bit.

"Night flying along the lighted airways is all right," said one pilot to a parachute man, "but along an unlighted route there's little fun about it. Every try landing by a parachute flare? As the flare candle burns the ash collects on it and dims it up, then as the ash drops the candle flares up intensely until you can't believe what you're trying to see on the ground."

Said the parachute man, "I don't don't think it's the ashes on the candle but the fact that the whole thing oscillates as it comes down, the candle swinging back into the smoke cloud that it leaves. The new flare coming out in about a month is a 300,000 candle-power affair, burning 3 minutes. It has a triangle type 'chute', which as you know, does not oscillate. In tests of the flare this chute slid sideways as it descended in a sort of a glide. This brought the flare away from its own smoke and no trouble with dimming was experienced."

Bleriot Builds a New Amphibian

The most unusual features of the Bleriot sesquiplane amphibian are the clean cut wing strut arrangement and the bulk-head divisions of the hull.

THE most interesting constructional feature of the new Blériot 290 transport amphibian is the division of the hull of the craft into small water-tight compartments, following the technique used in shipbuilding.

A line of these compartments surround the whole exterior surface of the hull of the plane, except where doors and windows of the cabin interrupt them. Surrounding the interior with a series of tiny boxes makes it practically unsinkable, even if badly damaged.

Ship-like, also, is the interior division of the machine. The navigating and other instruments are placed well forward in the prow, followed by a roomy cabin for three passengers, and then, behind a double wall of exceptional thickness, are the reservoirs for fuel and oil.

The exceptional care devoted to the subdivision of the craft and the thickness of the partitions give an added factor of sturdiness for water operations, and the 290 has already shown herself capable of rising from even quite a rough sea without damage.

The machine is of the sesquiplane type with a wing-spread of 48 feet and a total length of 27 feet 10 inches. Its 230 h.p. Salmson motor mounted on the trailing edge of the upper wings drives it at an air speed of 112 m.p.h., and it has a ground landing speed of about 40 m.p.h. The placing of the motor, well to the rear, is another of the safety factors in case of accident introduced by the builders. As with most Blériots, the landing-gear is retractable into the lower wing and is controlled by the pilot.

The total weight of the new machine, empty, is in the neighborhood of 2,200 pounds.

Aircraft Radio for Private Owners

Here is an exceedingly compact aero radio receiver.

A NEW airplane radio set has been recently devised for the amateur flyer and private plane owner so that individual pilots can now enjoy many radio signals or broadcasts that have previously only been available to airline pilots.

This small receiving set, which weighs only seven pounds, will get weather reports, radio beacon signals and broadcast programs on waves ranging from 235 to 720 kilocycles with a single control and without the necessity of changing coils.

The use of these radio sets makes flying more pleasurable and much safer. They are mounted on the instrument board with either direct or remote control. Taking only three-quarters of an ampere, they can be operated from dry cells or very small storage batteries.

Five tubes are employed, three screen-grid amplifiers, one special detector tube and one pentode output tube. It measures 7 x 7 x 8 inches—a real miniature set.

If present conditions continue, it will soon be imperative that every airplane, regardless of size, be equipped with a radio receiver—if not a transmitter as well. Very likely, we will see future planes with a built-in receiver as standard equipment.

Undoubtedly, the many accidents of the past could have been avoided had it been possible for the pilots to tune into storm signals.

The Handley-Page Is Muffled

THE London-Paris service, using the new Handley-Page "H" class liners, apparently has almost conquered that bugaboo of air travel—noise. Passengers who have ridden in the huge ships report they are remarkably quiet in operation. Conversation can be carried on in an ordinary tone, they say, and the restfulness of air travel is thus very fully realized.

This is a matter to which the transport operators in the United States now are addressing themselves. The problem of noise in cabins can be solved partly through better engine muffling, partly through very complete soundproofing of the fuselage and most of all through reduction of propeller noises by the use of either slower moving, larger propellers or reduction in the blade length in those not geared.

It is well known that the prop also acts as a sounding board.

Forty Thousand Flying Miles

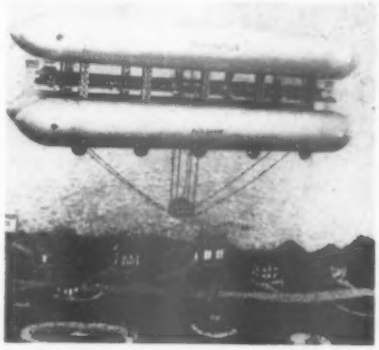
RICHARD HALIBURTON, adventure writer, with his pilot reached Los Angeles after completing forty thousand miles without the slightest accident or the necessity for any work being done on their plane or motor.

The two men left Los Angeles heading eastward. They crossed the United States, shipped to Europe and there flew southward, nosing the plane into many out-of-the-way places.

Twice they flew across the Sahara Desert, tried out the skyways of Persia, India, Burma, Siam, Borneo and the Philippine Islands, and made their way to San Francisco by boat. There they reassembled their "Flying Carpet", a Stearman open biplane and completed their globe circling hop to Los Angeles by air.

An All-Metal Dirigible

WE HAVE here, a further development of an all-metal four-hull dirigible. When built to present specifications, it will have a full size capacity of 5,000 passengers and will carry 200 airplanes as a part of its complement.



A model of the all-metal dirigible as it will appear in flight.

Simple Lessons in Meteorology

by JAMES A. SIMPSON

PART II

After Jim gets an idea of what meteorology is all about from his instructor-friend, Charlie, a second letter from Charley explains the use of the various meteorological instruments

Dear Jim:

I was all set for a few snappy wise cracks from you afte you received "meteorology lesson No. 1" in my last letter. Was I surprised to get 'em? Not a bit! I haven't known you all these years—ever since you were a pup in short pants—for nothing.

A mercury type barometer.

But man! You're the guy who asked me to give you a lift on this meteorology dope, so I went at it in my usual big-hearted way. If you don't like my earnest, plodding efforts to educate you plumb out of your meteorological ignorance just say so.

You say you fainted when you read my letter, and that your instructor, old Binks, fainted after you assimilated my No. 1 lesson and tried it out on him. That's reminiscent of a little experiment we performed during the Gallipoli campaign when I was helping our British cousins wreck part of their navy at the Dardanelles.

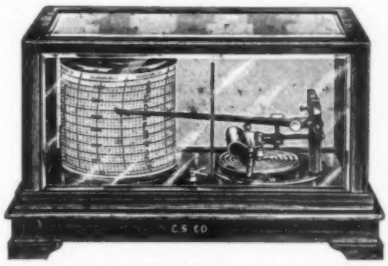
The officers' mess had an argument as to whether a goat smelled worse than a Turk. We brought in a captured native and tried him on the ship's mascot. When the Turk whiffed the goat, and the goat got a lungful of the Turk, they both passed out.

Judging from your letter, my introductory lesson must have been pretty potent stuff, so I'm all set to keep on along the same line. Maybe I can keep both you and Binks in a permanent coma—and what a relief that would be!

When I signed off last time, I was endeavoring to ventilate your impervious skull with a few facts about the earth's atmosphere. This subject of atmospheric pressure is *the* big noise in our study of meteorology, Jim, and I might devote an entire lesson to it, just like that, but we've got to cover a lot of ground, including temperature, humidity, wind and clouds, in this installment.

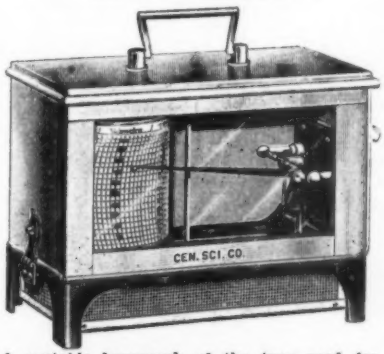
All of these are a part of the weather, and all of them are hooked right up with the pressure stuff, and naturally, you know all there is to know about 'em anyway!

Atmospheric pressure is measured by an instrument we know as the barometer. It is mighty important to find out what the weather is going to be like tomorrow—and the day after—and the barometer helps us learn this by keeping tab on the ups and downs of the pressure of the atmosphere.



A recording barometer for laboratory use.

An Aneroid barometer with a pressure scale and weather markings.



A portable barograph of the type used for recording flight altitudes.

When the barometer starts to fall, we know something is on the way. In the tropics, when it starts to fall rapidly, we know *plenty* is on the way. Storms don't just originate out of nothing in particular. They usually *come from somewhere!* and most always, they are "rolling along," like Ol' Man River, *going* somewhere.

And by keeping track of high and low pressure areas with the barometer, we know how to chart the track of atmospheric disturbances.

The laboratory barometer is mercurial, and is a right nice thing to have in the lab, but a heck of a thing to cart around in your ship. In fact, it just isn't being done, the aneroid type being lots handier even if less accurate.

Ever make a mercury barometer, Jim, back in your school days? Just take a couple pounds of mercury and a yard of glass tube, closed at one end. Pour the mercury into the tube, get all the air bubbles out of it, stick your thumb over the end that's open, and then get the open end into a cup of mercury.

Positively guaranteed to work every time! The weight of the mercury in the tube pulls it down, forming a vacuum above the mercury at the top. The pressure of the atmosphere on the surface of the cup tends to push the quicksilver back up into the tube. Result: The pressure balances the column of mercury and lets it move up and down in the tube in conformity to variations in the air pressure.

Swell-elegant, but too cumbersome, so the aneroid was invented. It's a simple gadget with an exhausted diaphragm cup (not tired, Jim, just empty) and connected with a movable hand by means of a multiplying lever.

You read your barometer in inches and hundredths. The aneroid is an unusually sensitive type, and must be checked at frequent intervals because of this fact. A good aneroid will indicate the difference in air pressure existing between the top of a table and the floor.

A recording barometer is known as a barograph. It makes a pen-drawn record of the pressure on a chart, and is right handy for the Weather Bureau to have in case they need to refer back to it.

Temperatures, as you know, are measured by the common or garden sort of thermometer. Most thermometers in the good old U. S. A. take off at zero, which is 32 degrees below the freezing point of water. This is known as the Fahrenheit scale. In Europe and most other countries the Centigrade scale, with the freezing point of water at zero, is the approved thing in thermometers.

Recording thermometers are called thermographs. They give a running

record of the temperature throughout 24 hours.

Humidity is an important phase of meteorology, Jim, and if you don't think so, just stop and recall some of the poor devils who got iced up when the dew point precipitated moisture on their struts, props and controls.

Saturation point is the point at which air can hold no additional moisture at its existing temperature. As the temperature increases more moisture can be held in suspension.

When we speak of the "relative humidity" we mean the ratio of the quantity of water vapor present in the air to that amount of moisture required to produce saturation at that temperature.

Absolute humidity is the actual amount of water vapor present in a given volume of air.

Humidity may be measured by means of a "wet and dry bulb thermometer," the technical name for which is psychrometer. By reference to tables which accompany these instruments it is possible to calculate the relative humidity from the difference between the wet and the dry bulb thermometer readings.

When it comes to making a recording psychrometer, the scientific sharks had to pull out a lot of hair to solve the problem. Believe it or not, Jim, human hair, when freed from oil, is a reliable moisture indicator.

The hygrometer, or hair type psychrometer utilizes a bundle of human hairs under tension, to make a record of changes in humidity. Moisture in the air causes the hair to stretch; a decrease in moisture makes it shrink. Simple little idea, Jim, and yet kind of hair-raising at that!

We have considered, thus far, atmospheric pressure, temperature and humidity and the various instruments used in measuring these phenomena. All three have important bearing on aviation. Changes in pressure bring us our different kinds of weather; changes in temperature and humidity produce our dry spells, our rainfalls and our snow and sleet.

There is another atmospheric condition you will bump into every day of your life, Jim, and that is our good old friend, Wind. And to the pilot, wind *means* something. Either he's bucking it, or riding across it, or he's booming along before it, high, wide and handsome.

On the high seas, since the disappearance of the sailing vessel, wind don't mean very much unless it reaches hurricane proportions, for a steamer usually can nose her way through nearly any sort of breeze on the weather map.

But in aviation you simply have to give the old wind sock a look if you want to know what sort of a breeze to expect and which way it's blowing. And you'll listen mighty well to the wind directions that come in on the weather reports, for wind has a great deal to do with how you are going to earn your bread and butter.

The little dingus that just keeps on whirling around like a four-ball pawnbroker's sign gone slightly nertz is an anemometer. It measures the speed of the surface wind in miles per hour. However, surface speed alone doesn't mean such a lot, because obstructions can make quite a difference in wind conditions.

If you have ever walked past a tall building on a day with a moderate breeze of four or five miles an hour blowing, you will know what I mean. At the corner of the building the accumulated wind pressure is fairly stiff. And over the top of that same building, if you were in the air, you'd find a similar condition existing.

Winds aloft may differ greatly from surface winds. To determine facts about upper-air conditions the weather bureau and Navy Department make use of pilot balloons whose behavior when released is studied by means of the theodolite. The ascensional rate of the balloon being known, it is a comparatively simple matter to determine the speed at various altitudes, and to learn the direction of the wind at these altitudes. You might think it a tough job to keep your eye on a pilot balloon, Jim, but it has been done even with the balloon 24 miles high!

When it comes to making a really intensive study of the upper air conditions, a meteorograph is used. This instrument is a combination of the recording barometer, thermometer and hygrometer, and is taken aloft by a balloon, kite or plane.

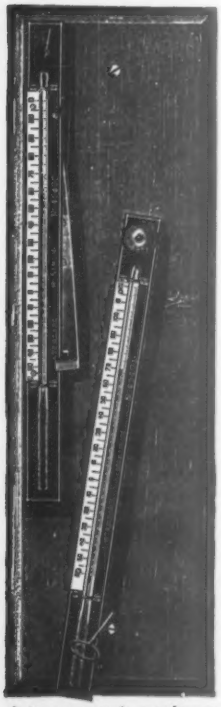
When a sounding balloon is used for this job, a chute is employed to bring the meteorograph to earth after the balloon bursts in the upper air. Much of the data we have available on the conditions existing far above the earth's surface has been thus obtained.

Now, Jim, you may think we have been pretty much up in the clouds in this lesson, but in my next letter I'm going to get clear away from meteorological instruments and their functions, and take you for a little flight into some of the clouds themselves.

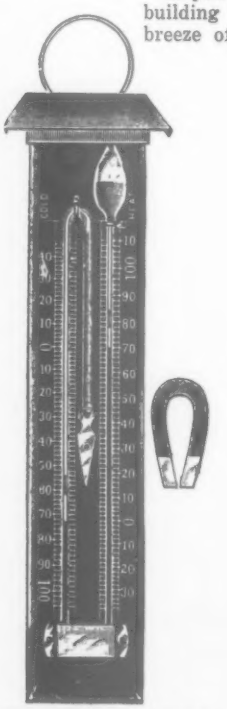
A good "cloud reader" is as valuable in aviation as a good mind reader is in a vaudeville act. I wouldn't recommend that any student of mine rely wholly on his "cloud sense," without regard to instrument observations, but I'll bet a good five cent cigar that the pilot who knows his clouds is a whole lot wiser than one who does not.

Meanwhile, let's hear from you when you have time. And if either you or old Binks passes out on any more of my long-distance meteorological instructions, don't wire me for any smelling salts! Save your money so your estate can settle with the undertaker.

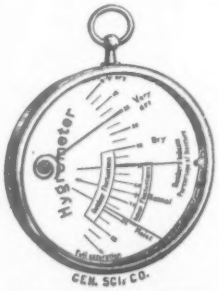
Yours, Charley.



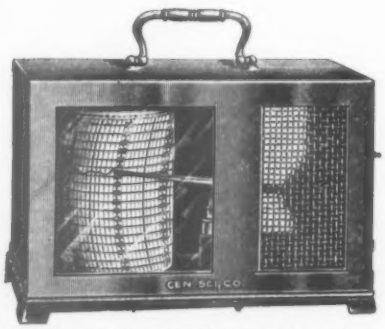
A government maximum and minimum thermometer for recording highest and lowest temperatures.



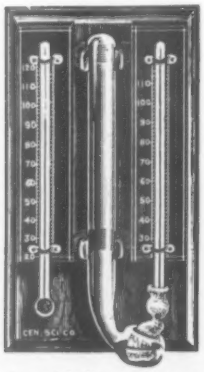
Differential maximum and minimum thermometer.



A hair type hygrometer.



A recording thermograph for tracing a temperature graph.



A wet-bulb psychrometer for measuring relative humidity.

Ogilvie Answers Reader's Objections

A heated dialogue on the old—old question of how Boelcke was killed. Some say that he was shot down by Rhys-David, others say that the Australian Battery got him, while still others claim that he died in a collision with his own men. Carl Ogilvie, after months of research hereby proclaims his belief.

POPULAR AVIATION,
Chicago, Illinois.
Dear Sir:

Please do not think I am one who scans your magazine just to find fault or error with it. But the matter I refer to was too obvious to overlook. In your July issue of P. A., it states in an article by Mr. Carl B. Ogilvie, that Boelcke, the German Ace, was never shot down, but was the victim of a collision with one of his own men. Yet, in your August issue, on page 79, "When Ace Meets Ace", it states that Capt. Boelcke was *shot* down!

I would rather believe the former happening, *not* because I think Mr. Ogilvie is a noted air authority, for I don't think he is, but because I have read Floyd Gibbons' book, "The Red Knight of Germany." The reason I state this, because Mr. Gibbons checks his story, by war pilots themselves telling of their experiences. In his article, Mr. Ogilvie as much as states Von Richthofen was a coward.

O, I know he doesn't state it, but his article fairly shouts it. I have not only read "The Red Knight of Germany," which gives a good account of the World War in the air, but Capt. Eddie Rickenbacker's book, "Fighting the Flying Circus," and in both of these books, it gives no mention of a flight of Fifty German planes, nor of Forty nor Thirty.

Mr. Ogilvie also contradicts himself. He states that Richthofen was not afraid to attack enemy planes because of the large amount of men to back him up, and guard him from rear attack. If Richthofen had as large a following as stated in the article, and he knew there was no danger of attack from the rear, and if there were 22 Fokkers to 7 Camels, and *each* Camel took on 3 enemy planes, WHAT WERE THE OTHER SIX FOKKERS DOING, WHEN CAPT. BROWN WAS ATTACKING VON RICHTHOFEN FROM THE REAR?

Personally I think Mr. Ogilvie and his article are a lot of hokum pokum. With my compliments I hope he reads the books I mentioned.

However, in spite of this, POPULAR AVIATION is going along great.

Yours, Wayne Linke.

Here is a picture, the authenticity of which has been disputed for years. It is reputed to show von Richthofen taking-off, but the opponents cry "baloney". Just one more problem of the many now in dispute.

EDITOR'S NOTE.—So much for the challenge and now testifies the defendant—full of steam. Ogilvie will now be heard and his opinions bear great weight since he has made the study of wartime truths and traditions his life work. This subject of dispute is nothing new—it has been going on for 14 years.

Dear Editor:

Since Mr. Wayne Linke wrote his letter in all seriousness and with the best of intentions to straighten out contrary statements that seem to confuse him, I am glad to make reply.

The last final flight of numerous pilots have more or less been shrouded in mystery and a veil of conflicting reports. It has been most difficult for writers, such as myself, who have spent many years collecting biographical and historical data, to always arrive at "what exactly took place in the air."

Due to the complexity of the dogfight, the brief fraction-splitting of seconds when death or victory hung in the balance, important points are frequently open to discussion and differences of opinion. Editors occasionally publish stories that conflict on some major point as long as the stories reveal something new and interesting to their readers and thereby let the reader become well informed as to several sides of a question.

Let a dozen people witness an accident on a street corner and you will have as many different reports of what took place. Such is the case in such high controversial arguments as: Was Richthofen shot down by Captain Roy Brown from the air or by the Australian 53rd Machine gunners from a front line trench position?

The exact circumstances of the death of Second Lieutenant Frank Luke was,

Well, fellows, who shot down this Breguet? Some say that this was Boelcke's job—others say that Udet did it. Just one more example of observers' error.

for weeks, undetermined—unknown.

There are two absolutely contradictory reports, both sworn to by eye-witnesses, regarding Major Raoul Lufbery's death.

The killing of Oberleutnant Max Immelmann was reported to have been accomplished by two different men—McCudden and also by McCubbin, yet one of these ace pilots was in England at the time.

The death of one of France's greatest aces, Georges Guynemer, is still today one of the unsolved mysteries of the World War. (The interesting facts of each of these world-wide famous men I intend giving completely to the readers of POPULAR AVIATION in the near future as I have a preponderance of data collected after over fifteen years of effort.)

That there should be different reports regarding Oswald Boelcke's death is not to be unexpected. Eye-witnesses from a distance would naturally assume and report he had been shot down. Only the report of the pilot, very close and in a proper position to see Boelcke's student-flier's wing brush that of his teacher's, would be correct. Yet both reports would be circulated and gain credit.

In my copy of Floyd Gibbons' book, "The Red Knight of Germany," published by Doubleday-Page & Co., facing page 84, there is an excellently rendered illustration of Boelcke's plane being crashed into by another plane bearing the Maltese Cross on its upper wings. The painting is by Clayton Knight, an acquaintance of mine who served as a pilot in an American squadron under a British Wing. Several pages are given over to details of Oswald Boelcke's meeting death by collision in mid-air with one of his own pilots.

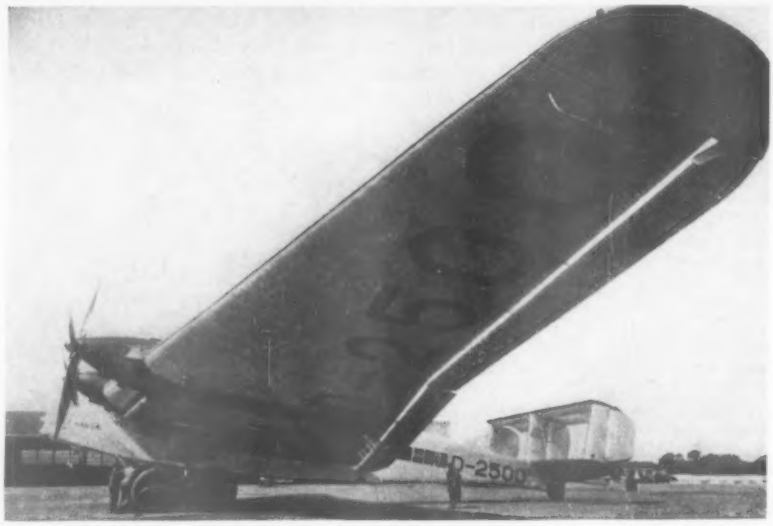
The readers of POPULAR AVIATION may be interested to know that my former newspaper colleague, Floyd Gibbons, is not the only writer who "checks his story by war pilots themselves telling of their experiences." I believe that I know personally and have interviewed more air service men throughout the world than any other one biographer.

I am quite sure that I possess the largest and most complete file of war pilots and air-war data of any one writer and that I have had the friendly cooperation of more high ranking officers of the Air Corps of various nations of the world than any other one military-aviation historian. My military service as Chief of Intelligence has naturally put me in close touch with many facts not known to the general public. I collect data from many authoritative sources before I begin writing an article.

To write an article about an ace who went "west," I interview everyone I can personally, or by letter, that knew the man, to get inside facts about him. Many items I have revealed for the first time were gotten by conversing with the aces themselves.

(*Continued on page* 263)

The Largest German Land Plane



One of the most prominent features of this Giant Junkers is the biplane or "Box Kite" tail.

IT IS said that the new Junkers "D-2500" is the largest German landplane at the present time. It is being flown on the Berlin-Amsterdam-London line.

Curiously enough, it is a monoplane equipped with a biplane tail, the weight being so great that the usual monoplane tail would not leave sufficient area to handle the load. It will also be noted that the ailerons are separated from the wings with a considerable gap.

The D-2500 carries 34 passengers comfortably and so located that they have a good view above the wing surface. It is propelled by four Junkers L-88 engines.

Gliding — the King of Sports

THRILLS! Oh boy and how. This he-man's art of gliding may be the sport of kings, but it sure has a way of showing up the stupid and the wise.

After working several months on one of these air coasters, it seems to be the proper thing to spend about that much time keeping it in flying shape. Long are the hours thus spent and many the battles fought with the better half when the wee small hours of the night found me sneaking in the back way after carefully removing my shoes. You married glider bugs know how the wife begrudges the shekels spent on air buggies.

To relate this tale still makes the red corpuscles simmer, but here goes. Having spent all the cash we could get into one pile, we were forced to use a tow-line instead of a shock cord. While they tell me this is a poor way to start beginners we have found that it brings results.

It's a case of fly or crash, and I think it gives a pupil more confidence than hopping over the ground with a cord. While I appreciate the fact that many a crate has hit the bone-yard because of over confidence, you've got to admit that it has pulled many a bug out of tight places.

But on this particular morning, after spending the biggest part of a Saturday night mending a broken wing tip, I smeared myself, we pushed the job into the glorious morning sunlight. Peach of a day, wind sock gently moving and everybody full of the old pep. Now regardless of the many wisecracks made about Henry Ford's Lizzies, I'm here to say that never was a better glider tow car made than Hank's Model "A" roadster.

We backed up the Liz and hooked on. The books showed that a Mr. Smith was due for the first hop. We had been warning the fellows about grabbing off too much sky because of the smallness of the field. Enclosed by a four foot wire fense it didn't mean much to the powered ships, but with us it was a real menace.

This bozo being the wise guy of the club (every club has at least one), we warned him in very plain English to keep within the confines of the field.

Well, to give him his dues he did and how. After a beautiful take-off from the far corner of the field the roadster took him along at a thirty-five mile clip. Peach of a flight but still not content he had to give us a thrill by trying to stretch the glide and make a good landing out of bounds. He did. The instructor riding in the back seat of the tow car frantically

(*Continued on page* 268)

Howl Department for Amateurs

Here we hear the howls and constructive comments from the Curley Wolves of aviation. "Existing laws must be modified if amateur aviation is to progress," they say—and they know.

OUR good old howlers are getting down to business. Instead of loudly lamenting their fate they have now arrived at the stage where they are making suggestions for remedying conditions now existing in amateur aviation. Fine—that's the spirit!

We are receiving suggested codes, proposed petition forms and various other improvements that have a direct bearing on the actual attack on the problem before us. It is therefore entirely likely that we will start to draw up papers on the job in the next two or three issues of POPULAR AVIATION.

* * *

NOW, before us is a letter from Philip Appleby, Auburn, Ala., who makes pertinent remarks upon the subject of the pending changes in the Air Worthiness Laws, to be put into effect on January 1, 1933. Let us read his scheme—

Here is a suggestion for your "Howl Department for Amateurs," The Air Commerce Bulletin, just out (Vol. 4, No. 3), contains a list of proposed changes for Bulletin 7-A "Airworthiness Requirements for Aircraft." These changes are to go into effect January 1, 1933 and manufacturers are invited to submit any criticisms.

Now while they are amending this bulletin, why can't we have them put in a section to fit homebuilt planes? They will do this if enough pressure is brought to bear and if they are not just catering to the wishes of a few large manufacturers. It is worth trying, at any rate, and there is plenty of time between now and the first of January to do something about it.

I am writing the Department of Commerce, suggesting that the stress analysis, etc., on home-built planes be waived and instead simply require a visual inspection and practical demonstration for a license. A special license may have to be adopted, but what we want is a license that will allow good ships, such as the Pietenpol and numerous others, to be flown without restrictions.

Of course, they won't pay much attention to my letter, but if numerous others of a similar nature are sent in they may take notice. If they don't, this fall when the Democrats get in office we'll make some changes in the personnel of the Department of Commerce.

This is a very good suggestion and aims right at the basic laws governing airplane inspection and construction. When this bulletin is being revised, why not let us make our criticisms on the matter as well as the manufacturers? We would like to have some more remarks on this particular subject by other of our readers.

Amateur flying in home-built planes is the king of outdoor sports. Must it be brought to an end by the acts of legislators unacquainted with the sport?

AND now we have the heartfelt plea of Elery E. Young, Raderville Route, Casper, Wyoming. He believes in amateur licenses and also that the amateur builder should be consulted in making laws and not be walked over by a few ignorant political appointees. Read what he has to say:

Your howl department is a very interesting section: in fact I think the laws could be made by the howlers much better than they can by a bunch of saps, that could not drive nails in a board, much less build a plane or fly it.

I say, let the lightplane builder go to it, give him an amateur license.

If he builds a plane that will come up to the specifications, say of the Heath Parasol, give him a license, marked "AA257NC" or "Amateur Aircraft 257" non-commercial. Or, if it will come up to an experimental type it would carry a marking "AE257" (amateur experimental). The latter marking is for one place planes, but requires all amateur aircraft to comply with a safety level.

I believe that the amateur builder will do more to make the nation air-minded than any other branch of aviation.

When the amateur can build a plane within his means he will build it. Think of the training that would mean to him, which would be as beneficial to our government as the civilian training plan. He would not only get a few hours but would keep in practice, and ready for the opportunity or emergency when it came.

The idea of a special rating and marking, while not exactly new, is a good idea in general. The procurement of this license should be simple and reasonable without any departmental gew-gaws. All this is for the benefit of aviation in general and not simply for one group of men. To assist amateur aviation means a wider interest in aviation among all classes of people —not merely amateurs.

* * *

WE NOW come to a letter written by Douglas Van Horne, an attorney of Seattle, Wash., to James Green, Walla Walla, Wash. Mr. Van Horne encloses a petition form which he suggests will do as a starter. The petition was relayed to us by Mr. Green. When this petition is signed, it is then to be sent to the Secretary of Commerce. This is getting near to the mark, according to the ideas of the editors of POPULAR AVIATION, but certain modifications may be required before it reaches its final form.

To the Honorable Secretary,
U. S. Department of Commerce,
Washington, D. C.

We, the undersigned, all citizens of the United States of America, respectfully petition your Department to establish "A Special Non-Commercial License for Home Built and Private Airplanes" under the following qualifications or their equals, and to co-operate with your department in the drafting of the regulations:

1. *No Stress Analysis shall be required as is now existing.*
2. *The Planes shall be inspected by a licensed mechanic or a Department of Commerce Inspector before and after the covering is applied.*
3. *The Home built ships shall not exceed one hundred (100) horse power.*
4. *Any major repair work shall be inspected by a licensed mechanic before the ship is flown.*
5. *Said planes shall be subject to the regular twice a year inspection.*
6. *The planes shall be kept in a reasonably good condition at least 80% of that required for an N. C. license.*
7. *Said planes shall be permitted to fly interstate.*

(Continued on next page)

8. *The regular pilots licenses shall be required.*

9. *Said planes shall not be flown for hire or reward.*

10. *Factory made planes not exceeding 3000 pounds gross shall also be eligible for this license.*

We would like to have comments, corrections or additions suggested by our readers for the above petition, and believe that with all of us working on this idea that a suitable petition can be drawn up and then distributed where it will do the most good.

* * *

NOW comes a letter from S. R. Jacobs, Pryor, Okla., who advances a taxation stunt for conditioning all of the lightplanes grounded in 1931. He sure proposes a mighty stiff tax which might or might not be applied to the purpose intended by our legislatures. You know how they are! Here we are:

For the benefit of the amateur airplane builder and as a means of preventing governmental and licensed airplane fanatics meddling, I would suggest that we draft into our 1933 legislature a bill to tax every licensed airplane sold from ten to fifty percent of its selling price, the proceeds to be used for the purpose of reconditioning all planes grounded in 1931.

Also, if an amateur inventor builds a plane that will successfully fly and is of a new design, the proceeds are to be used for stress analysis and condition his plane for government license.

When the larger airplane manufacturers and the licensed plane fanatics are faced with something like that they will have something to think about except capturing the aviation industry in its infancy.

Personally, we are not so hot about starting any taxation stunts or leaving any opening for the governing bodies to burden us with any more taxes than we already are standing.

* * *

HERE is a letter by Leland Silsby, 518 E. Liberty St., Ashland, Ohio, in which he comments upon the proposal of Mr. Harty in the June issue of POPULAR AVIATION. There is a great deal in what he says, particularly concerning the grounding of unlicensed planes by the Federal government.

The letter from Mr. Wm. B. Harty, that you published in the Airy Chat page in the June issue, has aroused more than a casual interest in me.

I certainly would discourage the bill that Mr. Harty mentions.

There are worse possibilities than those you referred to in eliminating the state control of aviation. It is my opinion, that should this bill be passed, in a short time there would be a Federal law requiring all planes to be licensed; resulting in one-third of all the airplanes being grounded.

Yes, by all means, civil aviation should be free from all interference, for the present at least.

I strongly recommend that civil aviation, if it needs any control at all,

(*Continued on page* 269)

A Light Triplane Attracts Attention in Chicago

(See Cover Illustration)

Side elevation of the Blaski triplane showing the corrugated dural body and engine.

ONE of the principal objectives of the lightplane builder is a small, compact ship, which can easily be handled by one man and stored in a small space—in a garage for example. Again, short wing spans eliminate much weight and many undesirable braces necessary with the longer spans.

One method of condensing the wing space is to use folding wings that fold back along the fuselage while in storage. This does away with one difficulty —storage space—but it introduces mechanical difficulties. The other method is to employ the multi-plane principle in which the area is divided up among two, three or even more surfaces. The triplane and the quadruplane are examples of the latter system.

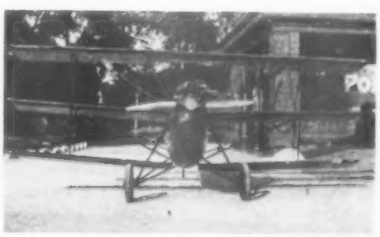
Now, the light triplane is nothing new for A. V. Roe built one 'way back in the infancy of aviation and some years later, Ricci built another light triplane. However, the triplane has once more been brought out of oblivion by J. F. Blaski, Chicago, who has built the small triplane shown here and on the cover of this issue.

This triplane is not alone interesting for the reason that it is a triplane but also because of the many novel details of construction have been adopted. For example, it is an all-metal ship with a corrugated dural skin. Second, the use of longerons in the fuselage has been eliminated so that the fuselage is essentially a monocoque body. Whether or not this particular triplane proves a success in flight is not important for the reason that it will awaken other builders to the possibilities of this type of construction.

There are many who will argue against this type of ship. They will point out the fact that the triplane wings are less effective than monoplane or even biplane wings because of the greater interference. And this is true. On the other hand, they overlook the many other advantageous points of the triplane which are features of utility rather than simple power efficiency.

One square foot of triplane surface will not lift as many pounds as a square foot of monoplane surface under equal conditions, but this loss is partly offset by the lighter constructional members, better aspect ratio and deeper and stronger interplane bracing. Wing spars, wing ribs and other members can be dispensed with in a triplane which must be employed with wings of greater span and chord.

In this particular triplane, Mr. Blaski did not avail himself of all the advantages of the triplane, but as it is an amateur experiment we cannot be too critical. The interplane bracing is too complex and the aspect ratio is less than it should be for good performance. With the deep chord used, the travel of the center of pressure is excessive and the longitudinal stability is disturbed by just this amount.



Front elevation showing the arrangement of the three lifting surfaces and the contour of the body.

Ocean Landing Saves the Flyers

TWO Los Angeles men rented a plane for a pleasure trip. The trip ended as an outstanding feat in airplane maneuvering. After about fifteen minutes of flying the motor went dead. It wouldn't start and they were too far from the field to return.

If they landed on the beach over which they were flying, it would no doubt kill many bathers as there were thousands of people on the long stretch of beach. They decided to try to make a landing out at sea beyond the surf line and away from the breakers and picked out a comparatively smooth surface, heading their plane, which was at about 2,000 feet, into the wind.

They glided into the ocean about a mile from shore and set the plane down as easily as possible. There was a splash. Then the spectators on shore were thrilled to see the two men crawl out of the plane and out on the wings to aid in keeping the ship afloat.

They were picked up by a fishing launch that also towed their plane ashore. The buoyant wings held the craft afloat for more than an hour and a half and the dismantling was done ashore. Outside of a good ducking neither of the flyers was injured in any way.

A Valuable Chart for Homebuilders

by P. A. TECHNICAL STAFF

An article, together with charts, that shows a simple method of making preliminary estimates for wing loading, wing area and the horsepower required for various planes.

DURING the past two years, the editorial staff of POPULAR AVIATION has been besieged with requests for information on wing-loading and horsepower loading, these queries covering all sorts and conditions of airplanes.

"How much wing area will be required for a plane weighing 2500 pounds," or again, "How much power will be required for propelling an 1800 pound ship at 125 m.p.h.," are typical examples of these questions.

And as usual, these questions were not accompanied by a sufficient amount of data to make conventional calculations possible for they ignored the matter of wing-sections, type of body and many similar items concerned with engineering computations.

After considering this matter for some time, it was decided that answers to such queries could only be rough estimates at the best, and therefore, the best interests of all concerned would be served by employing empirical data obtained from existing standard airplanes. To further simplify the matter, it was decided to employ graphical charts for showing the relations rather than to enter into long calculations.

And so, our editorial staff compiled a considerable amount of data on a great number of standard airplanes, afterwards plotting out the figures on graphical charts of which the two accompanying charts are examples. The curve, of course, represents the average values of standard practice in wing loading and horsepower loading for the various well known airplanes that have appeared during the past year.

Each plane is represented on the graph by a dot, and because of the number of cases represented, the chart is literally peppered with these dots. Because of differences in the design, such as would be caused by the use of different wing-sections or of variations in the layout, there is often a considerable difference between the loadings of the ships at the same speed. In such cases, the curve represents the average or normal condition.

Now let us examine Fig. 1, which shows the average wing loading for a monoplane in pounds per square foot at different speeds, ranging from zero to 400 miles per hour. The top speeds are scaled off on the lower horizontal edge while the loading per square foot is scaled off on the vertical edge of the chart. To use the chart, locate the desired top speed on the lower edge of the chart, follow up vertically to the curve, and then from the point of intersection, follow across horizontally to the scale of wing loadings. Here you will find a fair average value for the loading at that speed—close enough for an estimate.

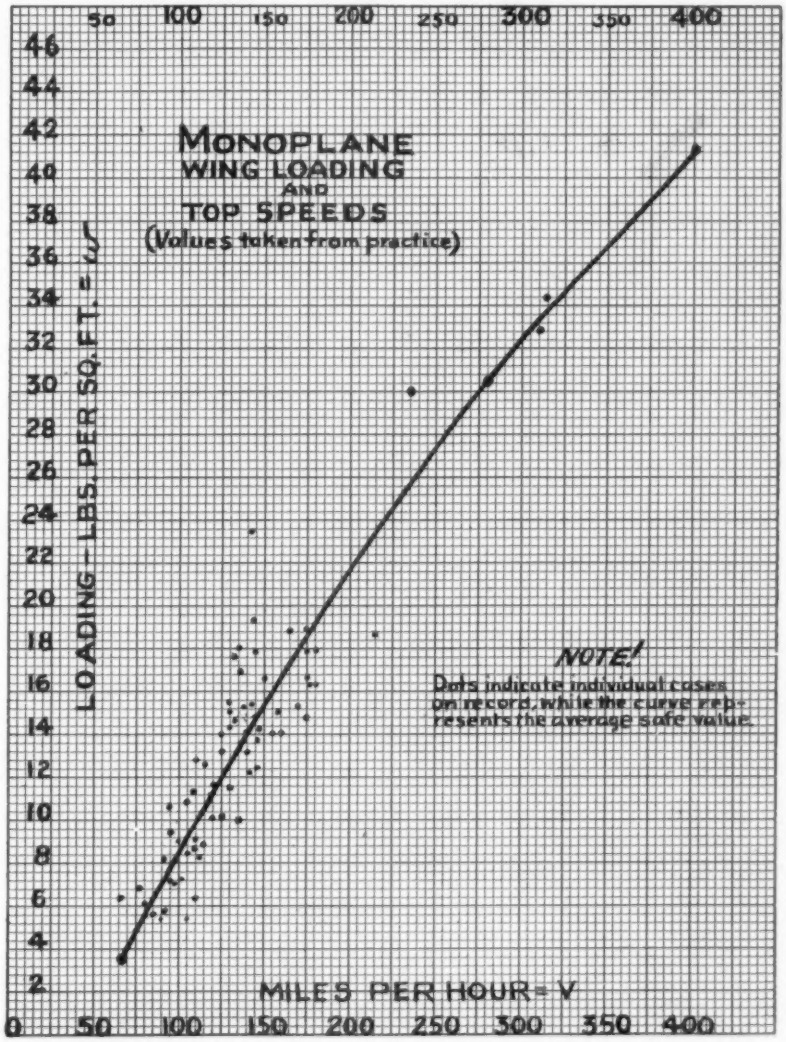


Fig. 1.—Chart showing the relation between the top speed (M.P.H.) and the wing loading in pounds per square foot. From the required speed at the bottom, follow up to the curve and then horizontally the left for wing loading.

For example, if our proposed plane is to have a top speed of 200 m.p.h., locate this speed, follow up to the curve and then across to the left where we will find the loading to be approximately 22 pounds per square foot of wing surface.

Now, in these figures, all practical factors are included, such as changes in the angle of attack. Hence, it will not be necessary to perform any separate or additional figuring.

It will be noted that the permissible loading on the wings increases very rapidly with the speed, but not so rapidly as in the case where the wing is held at a constant angle. In practice, the angle of attack is decreased when the speed is increased so that the lift does not increase as fast as the square of the speed as indicated by the formula in which (K) is a constant.

For example, let us say that we wish to estimate, roughly, the wing area of a monoplane that is to have a top speed of 110 m.p.h. On examining

the chart, we find that this speed corresponds to a loading of 10 pounds per square foot. If the monoplane weighs 2,500 pounds, fully loaded, then the wing area becomes:

$$\text{Area} = \frac{2500}{10} = 250 \text{ square feet.}$$

This is simple enough, and will give us an idea of the actual area required. Then, when we get down to brass tacks, for the final design, and when we have decided on a wing-section, we can recompute the area more exactly. But there is not likely to be much difference. It should also be noted that the graph is only true for monoplanes and that the figures are somewhat different for biplanes.

It should also be noted that, being taken from practical machines, this data takes landing speeds into consideration so that the landing speeds are commensurate with the given top speeds.

Wing loading has gradually crept up with the steadily increasing top speeds. The old Wright Model "B", was loaded approximately to 3.5 pounds per square foot with a top speed of about 45 m.p.h. During the war, the demand for higher speeds brought the loading up to about 16 pounds per square foot, while the Schneider Cup Supermarine racer with a top speed of over 400 m.p.h. was loaded to more than 40 pounds per square foot.

And next, we will examine the horsepower loading chart which indicates the weight in pounds carried per horsepower for various top speeds. This chart, also for monoplanes, is used like the wing loading chart so far as the reading of quantities is concerned. By means of this chart we can estimate the rated engine horsepower required for driving an airplane at various rates of speed.

To use the chart, start by locating the desired top speed required in m.p.h., follow up to the curve, and thence horizontally to the left where the permissible horsepower will be found marked on the vertical scale. This is the average loading for that speed that has been found desirable for present practice by the builders of standard makes of planes carrying an Approved Type Certificate.

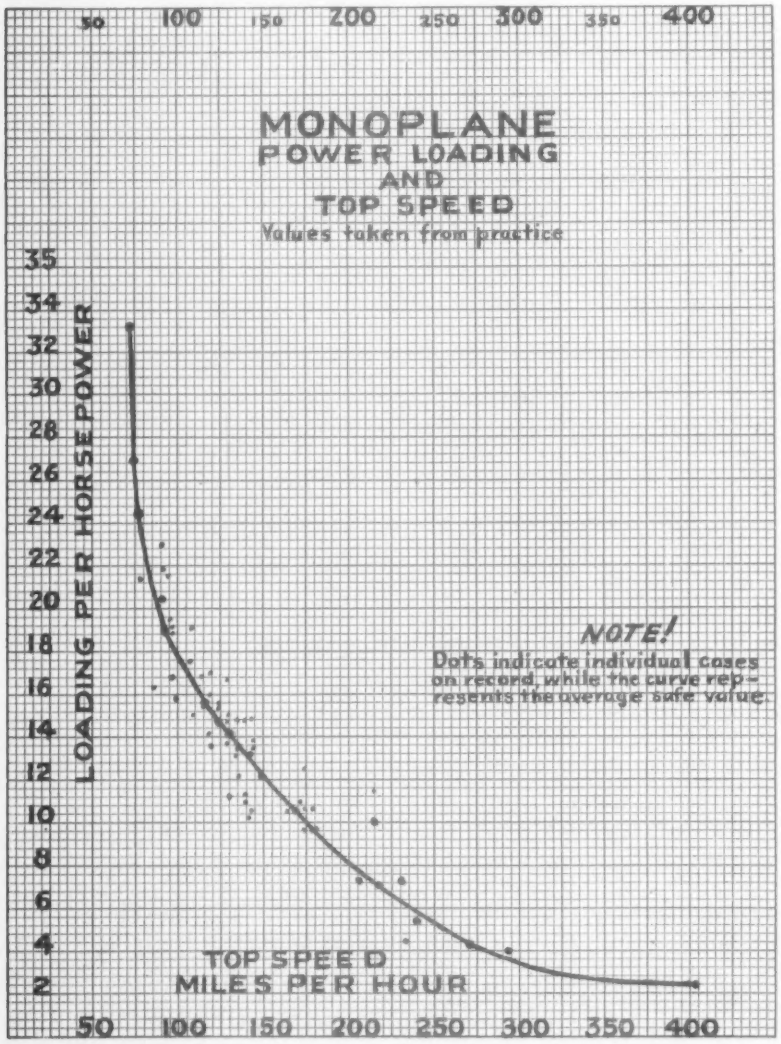


Fig. 2. Chart showing the relation between the top speed of an average plane and the loading per horsepower. Thus, at 150 m.p.h. top speed, the average plane is loaded at 12 pounds per horsepower.

This is not the greatest number of pounds that the engine is capable of lifting from the ground, but it is the greatest weight advisable. There should always be some reserve power for climbing and maneuvering in excess of the power actually required for driving the ship horizontally. For example, it is generally possible to lift as much as 40 or 50 pounds per horsepower at low-speed and without power reserve, but this would be neither practical nor safe in every day flight.

The horsepower considered here, is based on the rated horsepower of the engine and includes propeller losses, so that it is not necessary to make recalculations for propeller efficiency. After the horsepower loading is determined from the chart, divide the total loaded weight of the machine by this loading to determine the engine size. The nearest standard rating of the desired engine should be taken.

Just as a practical example, let us say that our proposed plane is to have a top speed of 150 m.p.h. It is to be a monoplane and we are to find the horsepower required for driving this ship.

Start at the speed, 150 m.p.h., along the bottom scales of the chart and follow straight up, vertically, to the curve. From this point on the curve, follow horizontally to the left where it will be found that the average plane having this top speed is loaded to 12 pounds per horsepower. Knowing the total weight we can then find the h.p.

Now, if the estimated weight of the ship is 2,400 pounds, total, then the rated horsepower will work out as follows:

$$\text{Rated horsepower} = \frac{2400}{12} = 200 \text{ H.P.}$$

This problem can be worked out in the reverse way, that is, with a certain engine we can find out the total weight that can be supported by that engine at the required speed by multiplying the horsepower by the unit power loading as given by the chart.

Say, for example, that we are building a plane "around-an-engine" of a certain rated horsepower. The top speed is to be 100 m.p.h., while the engine is rated at 50 h.p.

Looking at the chart, we find that a ship of this sort can be loaded to 18 pounds per horsepower, so that our permissible total loaded weight will be;

Total permissible loaded weight — 50x18 = 900 pounds.

In this chart, the curve does not start at "O" miles per hour, but starts at 69 m.p.h. instead, for the reason that no commercial ship is designed for a top speed of less than 69 m.p.h.

Question and Answer Department

All questions of general interest on any phase of aviation will be answered authoritatively by Popular Aviation's Technical Staff.

FOR the information of our new readers, we wish to state that this department is at their service and ready to answer any question on the subject of aviation that they may wish to present. This service, of course, is rendered without charge.

Address your queries to the Question and Answer Department, POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill. Write distinctly, giving your full name and address.

* * *

QUESTION:—Harry Withrow, Boston, Mass. *Is it possible to steer a parachute, that is, can the pilot direct the parachute to any particular point for a landing?*

ANSWER:—YES, a parachute can be steered to a certain extent by pulling down one side of the chute and allowing the air to spill out on one side. This causes an uneven distribution of pressure around the chute that causes it to move horizontally as well as vertically. The Army frequently holds landing contests in which the men attempt to land on a target.

* * *

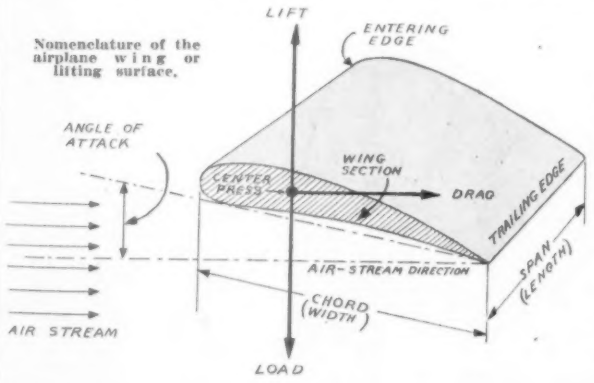
QUESTION:—Jos. A. Murdock, Moline, Ill. *What is the difference between a lifting and a non-lifting tail?*

ANSWER:—A LIFTING type tail carries part of the weight imposed by the after portion of the ship. A non-lifting tail is placed exactly in line with the air stream. It carries no weight and simply damps down oscillations.

* * *

QUESTION:—William Krug, Beaver Dam, Wis. *What is an ornithopter? Is it similar to a helicopter?*

ANSWER:—AN ornithopter is a "flapping wing machine" that imitates bird flight. It is a distinct type of flying machine all by itself and is not at all related to the helicopter.



* * *

QUESTION:—James Haig, Joliet, Ill. *What is meant by the term "liquid cooling" when applied to an engine? Is this another way of naming a water-cooled engine or a special engine?*

ANSWER:—OWING to the fact that many kinds of liquids are now circulated in the jackets of gasoline engines, ethylene glycol as one example, it was thought better to designate such engines as being "liquid cooled" rather than "water-cooled".

* * *

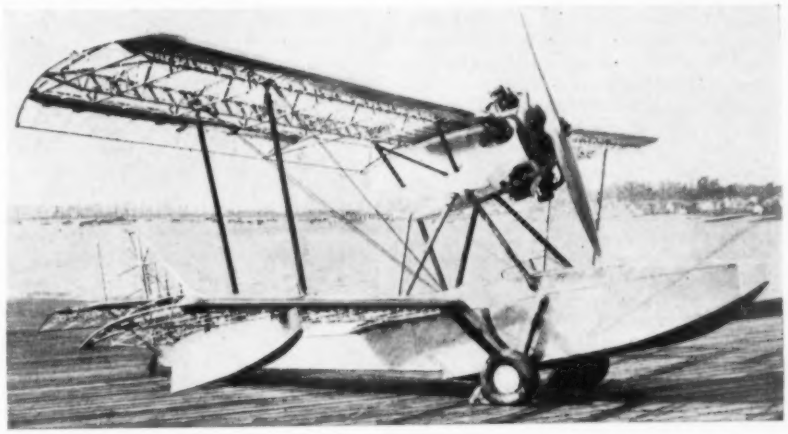
QUESTION:—Walter O. Berry, Sacramento, Calif. *What is the difference between magnetic variation and deviation? I refer to these terms as they are used in aerial navigation.*

ANSWER:—MAGNETIC variation is the amount by which the magnetic north pole varies from the true north pole as indicated by a magnetic compass. Magnetic deviation is a difference caused by metal contained in the ship.

* * *

QUESTION:—John Bauer, Hammond, Ind. *What causes a dirigible to rise, the gas or the engines? A balloon will rise when the ballast is thrown overboard, but how is a dirigible controlled.*

ANSWER:—BY both the gas and engines, depending upon conditions. When flying under normal conditions, the ship gains or loses altitude by the power derived from the engines. When a very sudden climb is desired, or when the ship has lost so much gas that control by the elevators is out of the question, then ballast is discharged. This latter, however, is an emergency method known as "ballooning", and as it is wasteful of a very expensive gas, it is not used under normal conditions.



Showing the retractible landing gear of an amphibian.

* * *

QUESTION:—Al Boggs, Clinton, Ia. *How much does gasoline weigh per gallon? Is it much lighter than water?*

ANSWER:—GASOLINE is not a simple definite liquid like water. It varies considerably in weight, the aviation grade or "high test" gasoline weighing much less than common automobile gasoline. It may range from about 5.5 to 6.5 pounds per gallon while water weighs about 8.34 pounds per gallon.

* * *

QUESTION:—Fred H. James, Roanoke, Va. *We have had an argument at school as to whether a body weighs more at sealevel than it does on a high mountain top. Please settle this dispute.*

ANSWER:—YES, a body weighs more at sealevel than at higher elevations. It weighs more at the equator than at the poles. It weighs more when traveling toward the west than toward the east. This is indicated with spring balances, but when weighed with a yard arm and weights, no such difference is shown because the same gravitational attraction acts both on the body and the weights at the same time.

* * *

QUESTION:—Hamilton French, Bar Harbor, Me. *Please show a typical arrangement of an amphibian landing gear together with the hull of the ship.*

ANSWER:—THE illustration accompanying this department shows the landing gear and the exposed wing members of a typical amphibian. As shown, it is resting on the wheels, but when landing on water, the wheels are retracted so that they are not immersed.

More Laws for Air Safety

THE New York State Commission on Aviation has approved a measure whereby destruction of an airplane after an accident resulting in injury or death to persons before examination by a representative of the United States Department of Commerce or a state trooper would be prohibited.

Two other bills considered by the State Legislature were not approved by the Commission. One of these bills would require operators of passenger planes for hire to provide parachutes for all passengers and pilots, and the other would insure the construction of at least two exits in all passenger planes.

Baby Kills the Engine

CURIOUS baby fingers, tampering with a petcock on an airplane engine's gasoline line, abruptly halted a Miami-Nassau plane flight and were responsible for an uproar in Miami aviation circles.

Eddie Stafford, pilot of a chartered plane, returned here after making a forced landing on Andros Island, Bahamas, while he was carrying five passengers between Bimini and Nassau.

Stafford reported a child in the party wandered about the cabin during the flight from Miami to Bimini and after the plane left for Nassau, the engine coughed and died.

Next Will Come the Wings

ERNEST WINTER, English merchant, with his novel propeller driven bicycle. The propeller at the rear is driven, through chains and gears, by the pedals, and it is said that the cycle develops quite a speed—15 m.p.h. having been attained in trials.

It is not a great step further to add wings, and then what will happen?

However, this arrangement must make more than 15 m.p.h. if he hopes to take off with reasonably small wings.

Maybe after he develops some muscle on his aero bike, Winter will be strong enough to take a short hop. Who knows?

Jack, the Mascot Cat

Jack enjoys life at the airport.

"JACK," the cat mascot of Ohio Valley Airport, Marietta, Ohio, not only likes to fly, but has an unusual instinct of danger and safety when in a plane.

Property of J. W. Sodowsky, chief pilot at the airport, this airminded cat began his flying career when he was only a few days old, and has had many hours in the air. He is taken on most cross country flights and never seems to tire of flying.

When a plane is slow in gaining speed or is "hedge hopping," Jack crawls down and lays flat against the seat until he is sure the plane has gained altitude.

His favorite is a racing type cabin plane. However, he also takes a fancy to a small open monoplane that has space for him just back of the pilot. Here he sits and watches the country below and to the back of the ship. When the air is extremely bumpy, or Jack is in doubt as to a maneuver, Jack watches the pilot intently and a smile always puts him at ease.

Occasionally he puts his paws on the back of the pilot's neck as if he was wondering if everything is all right, but has never got scared or acted rudely.

When in the air he seems to have unusually sharp eyesight and can see objects at great distances.

New Napier Aero Engine

LATEST product of a well-known firm is the new 150 h. p. aero engine announced by Messrs. D. Napier & Son. Water-cooled "Lion" motors made by the company have been used extensively in every continent since the war and their reputation for trustworthiness and long life seems likely to be reflected anew in this most recent Napier engine.

Designed primarily for use in civil aircraft, the engine is air-cooled and inverted. This arrangement has many advantages, particularly in planes driven by tractor propellers, not the least being the excellent view forward afforded the pilot.

The six cylinders are located one behind the other in-line, and the Napier experts believe that they have entirely eliminated any risk of overheating of the rear cylinders. The normal rated power of 150 h. p. is maintained with the engine running at 2,000 revolutions a minute; at maximum engine speed of 2,300 r.p.m. the power given off is 170 h. p. Total weight of the engine is 410 pounds, equivalent to 2.4 pounds per h. p. at maximum power.

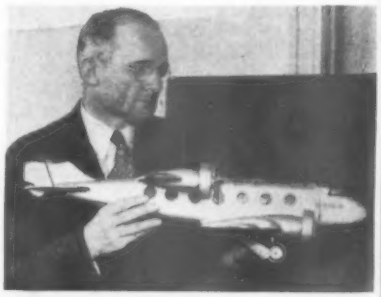
For several months the engine has been undergoing severe flying trials in a Spartan biplane. Now that the company is satisfied with its performance, production of the engine may be expected to match with the design and construction of new types of three and four seater aircraft built to use it.

It would seem that the present trend in all English airplane motors is toward the "in-line" arrangement of which many notably successful models have been turned out.

Another Capelis Invention

PROFESSOR JOHN E. YOUNGER, head of the Mechanical Engineering Department, University of California, is shown holding a model of a modified design of the Capelis plane.

The tandem monoplane wing arrangement of the original Capelis model has been retained with two wing engines on each of the wings. The front wing group is lower than the rear wing which will give better lift distribution and less interference. Actually in effect, it amounts to a biplane having an unusual negative stagger.

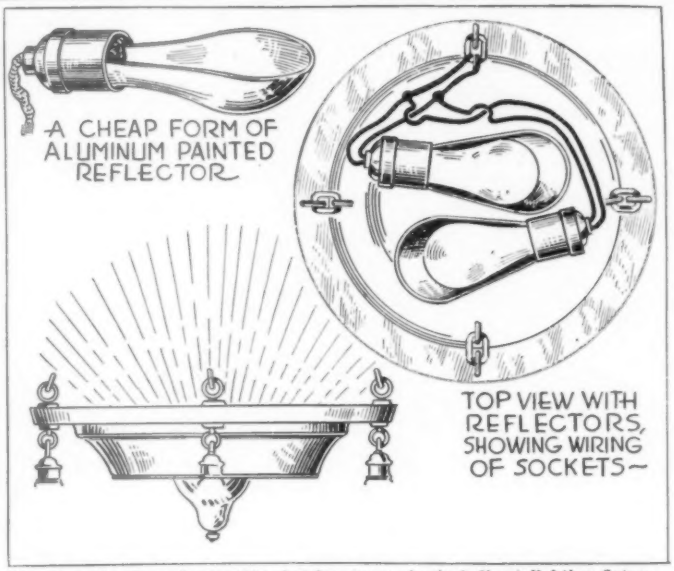


Showing the tandem wings of the Capelis airplane with the motors mounted on the wings.

A Page of Practical Mechanics

Brevities of practical use for the amateur mechanic and experimenter who like to tinker.

Indirect Light Fixture



Complete details and assembly sketches for a simple indirect lighting fixture.

INDIRECT lighting, which means illumination which is visible only as it is reflected from the ceiling, is popular in offices and stores, and is equally valuable in the home for the same reasons. It produces a rich and pleasing effect, throws no shadows and puts no strain on the eyes. Many ordinary lighting fixtures can be converted to indirect lighting in a few minutes' time.

Because mirror reflectors throw patterns on the ceiling unless specially designed, it is best to use dull reflecting surfaces, and the best of these is a coat of common aluminum paint. Pressed tin reflectors, aluminum painted inside, which clamp onto a lamp socket and embrace about half the circumference of a lamp, may be purchased cheaply in an electrical shop or hardware store.

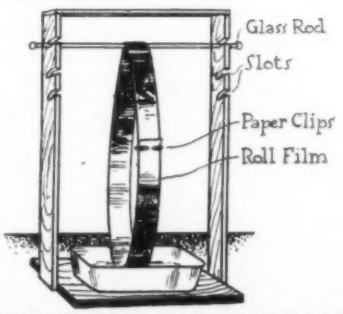
One or two of these reflectors and sockets may be laid flat on the upper surface of any disc or bowl-shaped light fixture. Probably no fastening will be needed after the electric wires are connected, but bits of string and wood may be used freely if helpful, since they will be invisible.

Electric light wiring should not be attempted by those unfamiliar with it, but every family has at least one informed member or friend who can spare a few minutes for the job. If more than one socket is used, they are connected, of course, across the line. If desired, the indirect circuit may be connected through a separate switch.

Developing Roll Film

DEVELOPING roll film by the see-saw method is very tiresome and only one roll can be handled at a time. An easily constructed rack makes it possible to handle two or more rolls simultaneously with less arm strain.

A base of wood about a foot square has uprights on either end of it, with a cross bar at the top, to insure rigidity. The uprights are notched to fit a glass rod from a towel rack, with the notches at such a height that the film, when looped over it, will hang in the glass, or other vessel containing the chemicals. Several notches may be cut if you use different lengths of film. Paper clips hold the ends of the film together and the loop of film is pulled around on the smooth rod the required number of times.



Film developer in operation, ends of film held together by paper clips.

Water Cutting Tests

WHEN steel cuts water, it's commonplace; when water cuts steel, that's news.

A tiny jet of water can now cut the hardest of steel alloys, it was announced by L. W. Chubb, director of research of the Westinghouse Company.

This seemingly miraculous achievement has been accomplished on a machine developed in the research laboratories at East Pittsburgh.

The purpose of the machine is to determine the rate at which different metals wear away as they cut through moisture laden atmosphere at high speed. The machine reproduces, in a few minutes, the wear which would take place on airplane propellers spinning at tremendous speed through rain and fog for months, or on steam turbine blades in years of service.

The machine consists of a disc wheel driven through gears by an electric motor. Two plugs, specimens of the metal to be tested, are screwed into the shell's rim at opposite ends of a diameter.

To the accompaniment of a deafening, piercing scream and safeguarded by a heavy casing, the wheel is whirled around 20,000 times a minute—333 times each second. At this speed, the little plugs are travelling more than 13½ miles a minute, 1200 feet a second—even faster than sound.

With each revolution of the wheel, both plugs cut through two jets of water scarcely larger than a pencil lead. The impact of the steel on water fills the enclosing chamber with spray. The moisture laden atmosphere duplicates conditions of rain or of steam filled turbines in which steel blades rotate.

The hardest metals and alloys known seem as soft as cheese when subjected to an ordeal in this testing machine. Quarter-inch plugs of stainless steel and of nickel steel are eroded half way through in two or three minutes. Stellite, famous for its hardness and iron nitride which is almost diamond hard, hold but 15 to 20 minutes.

How to Bend Wood

MANY woods, such as ash, elm, hickory and others, bend very easily when thoroughly steamed, but the making of a simple steam box for the purpose often baffles the beginner.

For short pieces of wood, use an ordinary wash-boiler with a little water over the bottom and with the wood laid on blocks out of contact with the water.

A steam box for long pieces can easily be made by using a steam pipe or a downspout, plugging both ends.

Improving the Electric Refrigerator

WHEN you are building your new home, or when you are looking for ways to improve your present conveniences, don't overlook the consideration of a basement mounting for the compressor in your electric refrigerator.

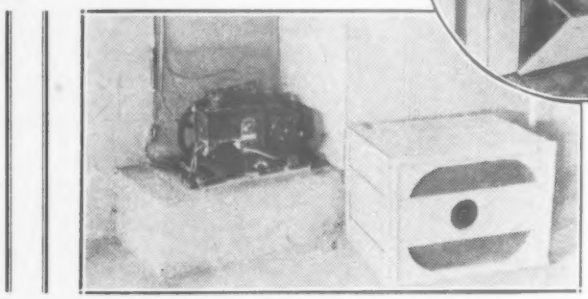
It is true that modern electric refrigerators are quiet in operation and that they require little attention in the way of maintenance. Yet there are many advantages to placing the compressor in a location that is readily accessible and where the noise of its starting and stopping will not be heard.

The accompanying illustrations show a permanent concrete mounting with a protecting screened cover that keeps out the children's mischievous hands. Where it is not practical to pour a concrete block for the mounting, a wood platform mounted on two by four legs will serve as an excellent substitute. The cover can be made up of almost any available material and ordinary window screen is sufficient protection from curious fingers.

In this particular case the temperature control dial was on the compressor, but in the newer models the control is located on the refrigerator, hence the hole to provide access to the control dial will not be required.

If your compressor is located in the base of your refrigerator, it is not a difficult job to take it out and lengthen out the connecting tubing for a basement mounting. The service department of your local distributor will be glad to assist in the actual work of making the change if necessary.

The space that is left after removing the compressor from the bottom of the refrigerator makes an ideal vegetable compartment. A piece of sheet metal may be used for a floor, as ordinarily the compressor unit is mounted on stringers to increase the ventilation in the compartment. By dividing the compartment with two or three partitions about six inches high, three or four bins are available for different kinds of fruits and vegetables.



At left: Compressor and motor placed on foundation in basement.

Above: Old compressor compartment in cabinet used as vegetable storage.

Electric Photo-Cells

The electric-eye opens the door.

A PHOTO-ELECTRIC-CELL is used in one of the leading hotels in Chicago to open the doors for the waitresses as they come out of the kitchen with loaded trays. Before this equipment was installed, there were many accidents, resulting in broken dishes.

The illustration shows the waitress as she passes through the beam of a small light. The interruption of the light on the photo-electric-cell closes a circuit and the electric motor seen above the woman's head, opens the door.

There is a timing device that closes the door after five seconds have passed. The five seconds give the waitress ample time to pass through the door. If the light beam is again interrupted before the door closes, it stays open for another five seconds.

The photo-cell, or "electric eye" generates a weak current when the light rays strike it, and then this current is amplified or strengthened by amplifying tubes like those in a radio set.

Another Magic Trick

THIS simple, magic "illusion" is very entertaining. Those who do not understand chemistry will never catch on.

The necessary material is easily obtained and is not expensive. Four ordinary tumblers and a few chemicals do the job.

The actor tells his audience that he is going to change pure water into wine, then change it back to water, and as a climax he will change the water into milk.

Into the first tumbler, pour some clear water out of a pitcher. The other three tumblers are lined up on the table. As far as the audience can see, there is nothing in them. Hold them up, to "prove" that they are empty.

In reality there is a little chemical solution in each. This is introduced before they are put on the table. Tumbler number two contains a pinch of phenolphthalein powder, or a few drops of the alcohol solution of the powder. Tumbler number three has a flake of lye or a pinch of washing soda. The last tumbler has received a few drops of hydrochloric acid (muriatic acid). The tumblers should be revolved a few times to spread the secret solutions.

To perform the trick, pour the plain water into the second glass, which contains phenolphthalein. The water will turn to a red color that has the appearance of wine.

Then pour the red solution into the third tumbler containing lye. Immediately the "wine" becomes a clear fluid again and looks like water.

When the contents of the third glass are poured into the last tumbler the clear solution becomes cloudy and resembles milk.

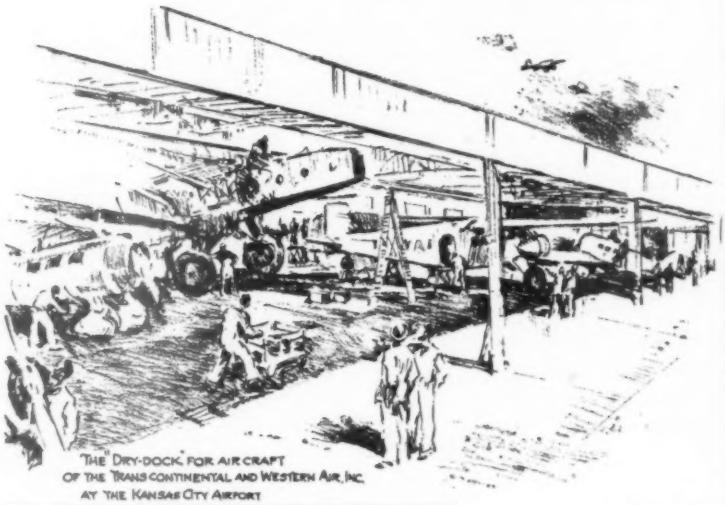
Storing Radium Safely

A radium storage vault.

TO SAFE-GUARD the radium used in hospitals against theft and to avoid the escape of dangerous rays, a lead-lined steel safe is used. Lead is the only barrier against the dangerous Alpha rays.

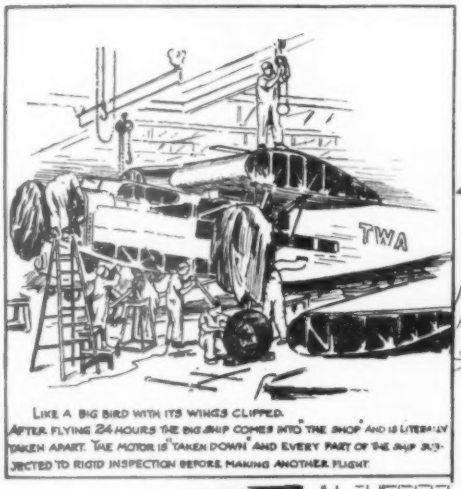
Servicing Commercial Airlines

Scenes in and about the inspection and repair departments of a great transcontinental airline system.

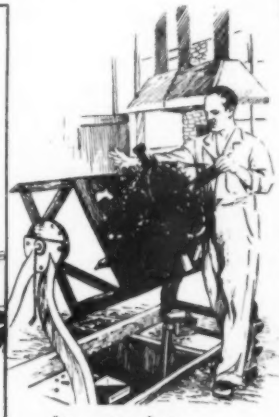


"THE" DRY-DOCK" FOR AIR CRAFT OF THE TRANS CONTINENTAL AND WESTERN AIR, INC. AT THE KANSAS CITY AIRPORT

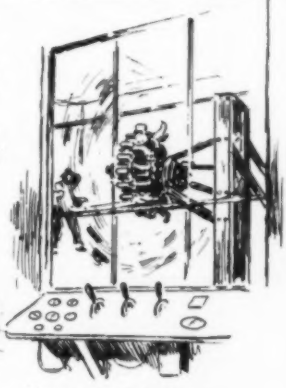
RIVETING ON A NEW PIECE OF CORRUGATED STEEL SIDING ON AN ALL METAL PLANE



LIKE A BIG BIRD WITH ITS WINGS CLIPPED. AFTER FLYING 24 HOURS THE BIG SHIP COMES INTO "THE SHOP" AND IS LITERALLY TAKEN APART. THE MOTOR IS "TAKEN DOWN" AND EVERY PART OF THE SHIP SUBJECTED TO RIGID INSPECTION BEFORE MAKING ANOTHER FLIGHT

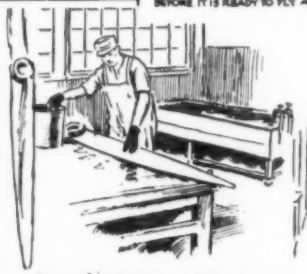


"TAKING DOWN" A MOTOR. AFTER 300 HOURS OF WORK IT IS TAKEN APART- 1620 PIECES - CLEANED, SANDBLASTED INSPECTED BY MICROSCOPE AND REASSEMBLED BEFORE IT IS READY TO FLY ANOTHER 300 HOURS.

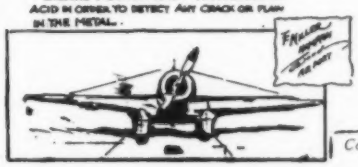


TESTING A REASSEMBLED MOTOR. IT IS RUN FOR A FULL DAY AT HIGH SPEED BEFORE IT IS REPLACED IN THE PLANE

ALL PARTS OF THE ENGINE ARE EXAMINED THROUGH A MICROSCOPE TO DETECT ANY FLAW OR DEFECT



"ETCHING" THE SURFACE OF A PROPELLER WITH ACID IN ORDER TO DETECT ANY CRACK OR FLAW IN THE METAL.



Courtesy of the Kansas City Star

What Our Readers Are Building

A department devoted to our readers' activities in airplane, glider and engine construction, showing the latest developments in the amateur field.

We Need Help Again

PERHAPS you intended to write up that ship of yours and send it in but have been careless. Please push matters and send us the dope because we sure will need it by the time our next issue goes to press.

Now, we know that this is not due to any lack of interest in this column, for we receive letters daily from our readers, telling us of their interest in this work. They are hot on the subject of lightplanes and gliders. So just take a few minutes, take a shot at your ship with the Brownie or any other camera that you use, jot down the main facts on a piece of paper and shoot it in. We'll be waiting.

A Man-Carrying Kite

THIS kite, which has much the appearance of a glider, has a carrying capacity of 186 pounds. It is the invention of George A. Argabrito and was devised as an instrument for aerial observation in war. It has passed its tests successfully.

Kite about to take off.

From Oklahoma

NOW, we hear from S. J. Tussy, Devol, Okla., age 16 years, who is stacking up a mighty nice looking job. If I remember correctly, this is the first time that we have heard from this state —a further credit to young Mr. Tussy.

He tells us that it is powered with a Heath B-4 engine with a Henderson crankcase. The fuselage is of wood construction, while the wings are of Heath parts.

The fuselage of the Tussy plane is a neat looking job.

Here Is a California Lightplane

This is the plane built by Vernon W. Payne, which shows remarkable performance.

VERNON W. PAYNE, 1438 McAllister St., San Francisco, Calif., writes interestingly of the successful ship that he has built and flown. Here is his letter:

Here is another lightplane that had its initial flight on April 15th, 1932. It is of the parasol type and has room for two in a pinch. The pilot sits almost in the passenger's lap, sort of sled fashion. That makes quite a large cockpit, but that can be changed in the next ship by making two separate pits.

The fuselage is of the semi-monocoque plywood type, similar to the Lockheed, but of a racier appearance because of the head-rest fairing leading back to the vertical fin. The width of the cockpit between the top longerons is 22 inches and at the knees the width is 28 inches, giving plenty of room.

The dimensions are: Length 20 ft., span 32 ft., wing area 130 sq. ft. Gross weight 875 lbs., empty 500 lbs., powered with a Continental A40 and a prop of my own design and manufacture having a diameter of 6 ft. Landing speed 26 m.p.h., top speed 95 m.p.h.

The wing is placed for best visibility. It has a cut-out in the trailing edge above the cockpit for easy exit. There is no need of putting a kink into your stomach when climbing in or out of this ship, for you can stand up in the cockpit.

The wings are tapered from the struts out and curved towards the L. E., giving the tip a combination of a negative rake and elliptical form. The landing gear is of the cantilever type, with the shock absorber in the bottom center of the fuselage. We intend to design a mono-strut landing gear for the next ship, making for more streamline.

The performance is something to talk about. You can stall it, hold the stick back in your guts and it will not fall off into a spin, but will mush down and forward.

In landing you can let go of the stick and the ship will assume a natural three-point landing position. She will land herself by throttling the engine. Perhaps you have already noticed that the control surfaces are large, making the ship effective in a stalled position. It can be rocked with the ailerons in a stalled position. The tail surfaces are more than ample to enable the pilot to quickly recover from a spin.

With the pilot in the rear seat and as a solo ship, he can let go of the stick and cause the ship to dive slightly or climb slightly by sitting up straight or leaning forward. This is because of the wind resistance of the large cockpit. Is that balanced enough for you?

If any other airplane bug wishes to build one like it, I will finish up some blue-prints, incorporating in them all of the new improvements. Everyone that has flown it seems to feel that a man could almost teach himself to fly it, for it handles so easy. Let it alone it will fly itself.

This is sure performance. When an amateur plane is balanced up to this degree, it almost becomes professional —or better. Plenty of control surface speaks for safety, and this is where most amateurs fall down.

Just one more example of a home-built ship which is giving satisfactory service—apparently as good or better than a commercially built plane of the average type. Perhaps, this ship and the many others like it, will give our legislators something to think about.

Anderson is Ready to Fly

THE fine little ship that you see pictured here is the product of G. K. Anderson, Red Lion Road, Torresdale, Pa. He says:

I have taken the liberty to enclose a couple of snaps of a home-built machine with which I am at present experimenting. Please note, however, that at this writing the machine has not as yet been flown.

Like all the rest, I've had the bug for some time, and this naturally brought on the results pictured herewith. The machine is a stick and plywood gusset construction, the forward cockpit being completely lined with plywood. All fittings, etc., are home-made.

The wing ribs were built up from the U. S. A. T. S. No. 10 section—conventional open braced and gusseted type. Let me suggest that considerable help can be had from the N. A. C. A. at

Here's G. K. Anderson's ship.

Washington. Ask for their booklets on The Aerodynamical Characteristics of Airfoils, covering a complete listing of numerous wing sections.

In preliminary tests, on hard, uneven ground, the machine accelerates quite rapidly under the power of a Harley Twin swinging a 4½ ft. homemade prop and responds to rudder easily and quickly.

General information:

Span	22 *ft.*
Chord	50 *in.*
Length O. A	15 *ft.*
Area with ailerons	94 *sq.ft.*
Wt. empty, 300 lbs. gross	450 *lbs.*
Wt. per sq. ft	4.8 *lbs.*
Wt. per h.p	25 *lbs.*
Estimated take-off	35 *m.p.h.*
Estimated landing speed	30 *m.p.h.*
Estimated top speed	70-75 *m.p.h.*
Power: Harley Twin	18 *h.p.*

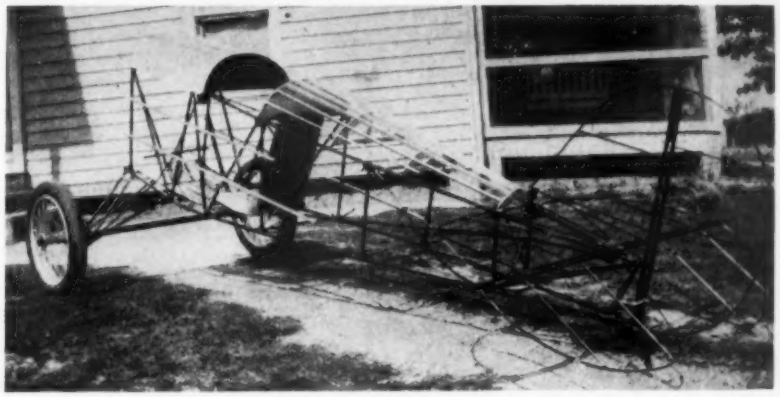
Tank: Motorcycle tank built into center section of wing (readily adaptable).

Let me say, however, the wheels mounted are 26x4 and I would suggest that a little more be spent and 18x3 or similar smaller wheels be used, as the weight of the 26x4 complete with tires and tubes and axle will mount up close to 50 lbs.

Thanks for the tips, G. K.; it does look like a good job, and with everything tuned up, should be able to fly well.

We hope to hear more about this ship and how it behaves on its test hop.

Allen's Ship is Ready for Covering



A good view of the fuselage built by R. K. Allen.

R. K. ALLEN sends us this excellent photo of the fuselage, landing gear and tail group of the ship he is building which shows up the details so well that we are sure it will be of interest to our readers.

It is very seldom that we get such a good view of the structural parts of our readers' planes, and for this reason it will probably prove of assistance to other readers who are not so well versed on steel tube construction. We hope we will receive more photos of these details which are so helpful.

One of the first things that we notice is the arrangement of the landing gear struts, a subject on which we hope that Mr. Allen will give more information. It is a well put up job in very many ways.

And Now Read This

Side elevation of Klempferer's machine showing layout.

ONE of our readers, Mr. Klempferer has sent us these photos of his fine high wing monoplane which presents points of interest.

One well considered point in the design is the streamlining of the nose and the very neat protection for the engine. This more or less recalls current English practice which favors a rather thin pointed nose.

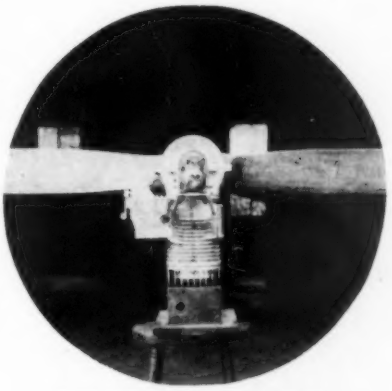
The view from the rear shows that the visibility is quite good for a high wing monoplane and that the wing struts offer little resistance.

Rear view of the Klempferer ship.

A Homebuilt Engine

HERE is a further detail of the engine built and designed by Glenn W. Berks, which was illustrated in a disassembled form in the September issue.

Being of the inverted type, with cylinders below the crankcase, it is well adopted to lightplane construction where every ounce of head resistance must be reduled to a minimum, and



Front view of the Berk Engine.

where a normal type engine would interfere with the visibility.

Mr. Berk says that this engine weighs about 80 pounds and develops about as much power as a Ford.

If any more of our readers are actually building engines, please write in.

POPULAR AVIATION FIRST INTERNATIONAL
MODEL AIRPLANE CONTEST

Here are some of the 81 prizes to be awarded. From left to right: Grand prize, third divisional prize, second divisional prize, divisional gold medal, first divisional prize. Similar prizes will be awarded in each of the four divisions.

81 Prizes Offered in Popular Aviation International Model Contest

GRAND PRIZE
FOR BEST ALL-ROUND MODEL
A beautiful Victory Colonnade standing 32 inches high as shown in accompanying illustration.

DIVISIONAL PRIZES

The following prizes are offered under each of the four divisions provided in the contest. (1) Flying Scale Model Event, (2) Non-Flying Scale Model Event, (3) Stick Model Event, (4) Most Original Design Model Event.

1st Prize. Trophy Cup.
2nd Prize. Pedestal, with airplane on globe.
3rd Prize. Beautiful Plaque Trophy.
4th-10th Prizes. Medals of honor.
11th-20th Prizes. One year's subscription to POPULAR AVIATION.

also, 10 honorable mentions in each division

One Grand Prize — 80 Divisional Prizes in All

GREAT news for the model building readers of "P.A."! An international model building contest in which 81 beautiful prizes will be awarded to the winners and everybody has a mighty good chance to win a prize.

This contest is expected to be the greatest one in model airplane history. All types of models from every corner of the globe will be considered by the judges, and the world's finest model will be selected from the competing thousands.

First of all it's going to be an open contest—open to all readers of "Pop". No matter how old or young you may be, whether you live in New York, Berlin, Paris, London, Singapore or any other old place, you'll be just as welcome to enter as a fellow here in Chicago. It's going to be the best and biggest model contest ever conducted, with none of the usual complications and difficulties that feature most large contests of this nature.

Think what it will mean to you to be one of the winners in this international affair! If you should be one of the winners, and there are 81 chances of being one, it will mean that you will be the undisputed international champion in your division—not merely a city, county or state champion. It's wide open to everyone so be sure that you are entered.

P. A., after doing a lot of deep figuring, has made it mighty easy for you to enter. You don't have to pay an entrance fee—it's free—nor do you have to raise the price to trapse way out here to Chicago with your model. You just build your model, the very best you know how, take a good clear snapshot of it and then send the picture to us. That's plenty cheap and simple.

After the photograph arrives in our office, the merits of your model will be judged by the Editor of POPULAR AVIATION and his corps of assistants, who will decide which of the models—81 of them—indicate the best workmanship, design or points of novelty. When this preliminary inspection has been made, the judges will write to the owners of the best models and have the models sent to Chicago for a closer examination. But please — please — please don't send your models without being asked to do so. If this was done we would be walking around knee-deep in models for the rest of our lives.

There'll be some mighty lively digging around for the Editor and his assistants, looking over the photos that are sure to come pouring in—you can dunk your doughnuts in that, and to have everyone ship in their models at once would make matters one hundred times worse.

And now for some dope on the prizes. First comes the Grand Prize which tops them all. This is a beautiful 3-foot silver Victory Colonnade which will be awarded for the best all-around model entered in the contest. It's a beautiful trophy and you will not only admire it for its own worth but also for what it represents—that you are the international all-around champion model builder. This Grand Prize heads the other four divisions in which the models are entered.

To give you fellows all a good chance to show your ability, the remaining

How to Enter the Model Contest

1. *Take one or more good photographs of your model or models.*
2. *Fill out the coupon, or a facsimile of same, giving name, address and classification under which you wish the model to be entered.*
3. *Paste a coupon, or facsimile, or write out the information on the back of each photograph and send them to POPULAR AVIATION, Model Contest, 608 S. Dearborn St., Chicago, Ill.*
4. *Please do not send a letter with the photos, nor ask us questions as to the progress of the contest. All such information will be found in succeeding issues of POPULAR AVIATION.*
5. *THIS CONTEST CLOSES DECEMBER 31, 1932.*
6. *As soon after Dec. 31, 1932 as possible, the 81 winning contestants will be asked to ship their finished model to Chicago where a group of expert judges will decide prize winners by a personal examination of the actual models.*

Start right in to build that winning model. Time flies, and the "dead-line" (December 31, 1932) will catch you if you don't watch out.

prizes have been arranged in four divisions, each division carrying 20 prizes of its own and it's up to you to enter that division for which you think your model is best qualified to enter. Altogether, these four divisions will have a total of 80 prizes so it's a cinch that you stand a chance of pulling off some prize, somewhere, even though your model may not be the best in the world.

Now, just look over the model classifications in the four divisions just mentioned and decide upon which one you are best qualified to enter or the one in which you are most interested. Of course, you can enter a model or several models in each of the 4 Divisions if you wish.

CLASSIFICATION OF MODEL DIVISIONS

Division — *Nature of Models*

(1) Flying Scale Models, copied from some large ship or made from some of the drawings that have appeared in P. A. Must fly.

(2) Non-Flying Scale Models, to be exact replicas of some full size ship.

(3) Flying Stick Models of any type, pusher or tractor, push-pull, R. O. W., R. O. G. or hand launched.

(4) Most Original Design Flying Model. The design must be entirely original with the builder. It must represent some novel idea or principal in aviation, or it can be a flying model of some less usual type of aircraft than the airplane, such as a dirigible, Autogiro, Helicopter, Rotor Ship, Ornithopter, etc. It must be a flying model.

Now, mind you, there are prizes under each of these divisions. The first divisional prize is a beautiful silver cup with the winner's name engraved upon it. For the second prize there will be a silver pedestal with an airplane mounted on a globe. For the third prize, in each of the four groups, the winner will be awarded a beautiful plaque.

Gold medals will be awarded to the next seven winners in each division who were successful in having their models sent to Chicago in the final competition.

But this is not all, for the next 10 model photographs in each of the four divisions (40 in all) will receive a whole year's subscription to POPULAR AVIATION. These 40 prize winners will not be required to send their models to Chicago for the final competition.

Just as a little consolation prize or remembrance for those who have not received prizes, but whose work showed real merit, we will publish a Roll of Honor and a degree of Honorable Mention in which the names of the next twenty entrants in each group will be published. All in all, 161 model builders will receive prizes or honorable mention. In each of the four divisions there will be a first, second and third prize; seven medals, and 20 honorable mentions. The best model of the entire contest will also be awarded the Victory Colonnade, which is one of the most beautiful and impressive trophies ever designed.

Of course, it is easy to understand that a good clear, sharp photograph of the model is necessary for judging your model. You can take this picture with any hand camera you happen to have around your home, a "Brownie" or anything else that will take a good picture. Readers can submit model photographs to compete in all four divisions. No limit is placed on the number of models that can be entered by any one contestant nor is there any limit to the number of photos to be submitted on the same model. Be careful to protect your photographs against bending while in transit.

The Model Contest closes December 31, 1932, and no more photographs will be examined after this date.

Yes, you have guessed it. POPULAR AVIATION, because of its intense interest in model building, has organized this annual contest for the purpose of encouraging and promoting better workmanship and design in model building. Just now, at least, we are not interested particularly in the performance of the models—their duration, speed or distance getting qualities. We are, however, interested in the development of model building—models of all sorts and the educational value of the models.

And now let's step on it fellows, and get the materials and plans together for that ideal model that you have always intended to build. Snap into it and show the rest of them how to do it.

Three months to the dead line—yes, we know—but then three months pass quickly in these times. So, begin today.

The following information must appear complete on the back of every model photograph submitted in this contest. This entry blank is printed for your convenience to paste on the back of photographs, but is not required so long as the information is filled out on the back of each photograph.

POPULAR AVIATION FIRST INTERNATIONAL

MODEL AIRPLANE CONTEST

608 South Dearborn St. Chicago, Ill.

Please enter this photograph in the division checked:
Flying ☐ Non-Flying ☐ Stick ☐ Freak Design ☐

Name .....

Street or R. F. D. .....

City ..... *State* .....

How to Photograph Your Model

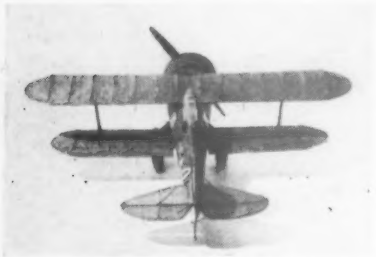
MUCH of your success in the model contest will depend upon the clearness of the photographs sent to us. Obviously, we cannot tell much about a model from a blurry, indistinct photograph.

Your photographs should be as clear as it is possible for you to make them. Almost any snap-shot hand-camera will

This model is obscured by a complicated background of buildings and trees.

do the job satisfactorily if you are careful to get it into sharp focus.

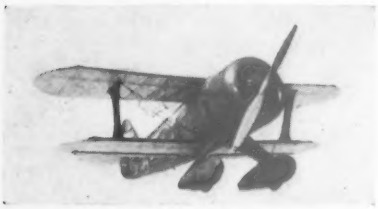
One of the most important factors in making these photos is to get a proper background. If trees, bushes or buildings are in the background,



Note how a plain white background improves detail.

they will confuse the picture so that it is sometimes almost impossible to distinguish the outlines of the model from objects in the background.

Therefore, an artificial background should be provided. A white sheet is proper for the background of a dark



Front view of same model against white background. Every detail stands out.

colored model or a black sheet for a white or light colored model. This background throws the model out into bold relief so that it can be easily studied. Suitable backgrounds can be made from bed sheets, large sheets of shelf paper or similar material.

The model should be placed on a box or stand with part of the sheet under it while the remainder of the sheet is held up behind the model.

Flying a Hand-Launched Twin Pusher Speed Model

GLIDING tests should of course be made before undertaking any flights with a twin push speed model. Two or three very important things should be borne in mind.

In gliding this type of model, a sharp forward thrust should be given approximating the speed at which it is designed to fly. It should glide four or five times the height at which it is launched under these conditions. The adjustments for it are the same as for every other twin push model; that is if the model stalls, it is over-elevated, and the main plane should be moved back a little. If it glides too steeply, the model is insufficiently elevated and the main plane should be moved forward.

In making flying tests, give the double motor the full number of winds, and launch it as in the gliding tests with a sharp forward thrust. Remember that the best results are obtained from this type of model when it flies a straight, level, and low course. so that necessary adjustments should be made with this in view. .

If the model shows a tendency to climb steeply or at an angle move the main plane backward a little. When flying and is nosing into the ground, the model is insufficiently elevated and the main plane should be moved forward. Make your tests over a measured course of 176 feet, and time with a stop watch; so that you may figure the speed of your model.

If you apply the above information to the flying of your hand-launched twin push model, you will get a satisfaction all its own in launching, and watching it perhaps cover the ground at the speed of an express train.

MODEL dealers and model manufacturers are invited to send in for reprints of our model contest announcement appearing in this issue.

These reprints can be distributed to their customers and friends, whom we believe, would be interested in learning of the contest.

Attention! E. M. Love

DO you remember the ingenious "Rubber-in-the-wing model shown in the September issue? Well, at last the inventor has turned up and has given us his name.

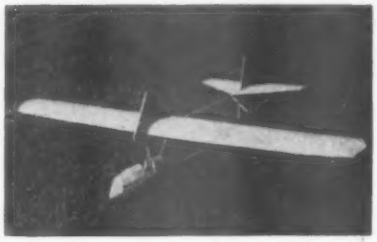
His name is Ed. M. Love, 73 W. Valnett Ave., Arcadia, Calif.

Carbon Dioxide Motors

CARBON dioxide motors, operated by the liquefied gas in the steel capsuled "Sparklets" are staging a comeback.

It is said that the previous difficulty experienced, freezing up, has been completely overcome by the addition of heat radiating fins.

A Secondary Trainer

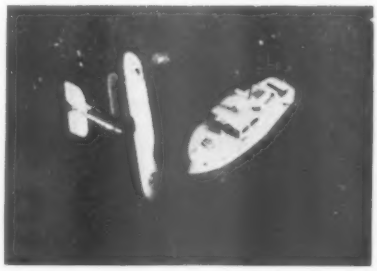


This secondary glider model is true to life.

JOHN BARNS, who does not give us his address has made this "secondary glider". We are glad to include it in this page, for most of the material we get is confined to models of well known airplanes.

Barns tells us that his plane, with a four and a half foot wing-span, has given very fine results. The picture was taken as it landed after the first hop.

An Action Pose



Model attacks model.

A MIMIC battle is shown here between a model plane and a model ship, which is quite realistic. We would be very glad to announce the builder of this display—but he forgot to sign the photograph.

Many such incidents can be staged in this way and we suggest that this will prove an interesting branch of the work.

A Lineup of Models

A wartime grouping of German type models.

HERE we have an interesting wartime "line-up" of German planes—all models, however. From the looks of things, there is a painted background to bear out the illusion.

Once more, our contributer is nameless for once more a photograph was unsigned.

Novel Model Ideas by Our Readers

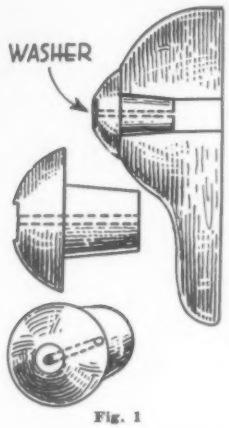


Fig. 1

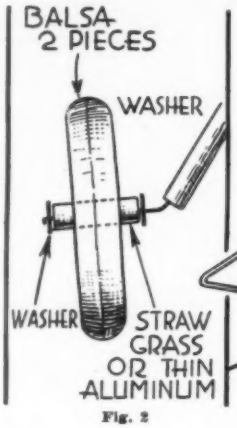


Fig. 2

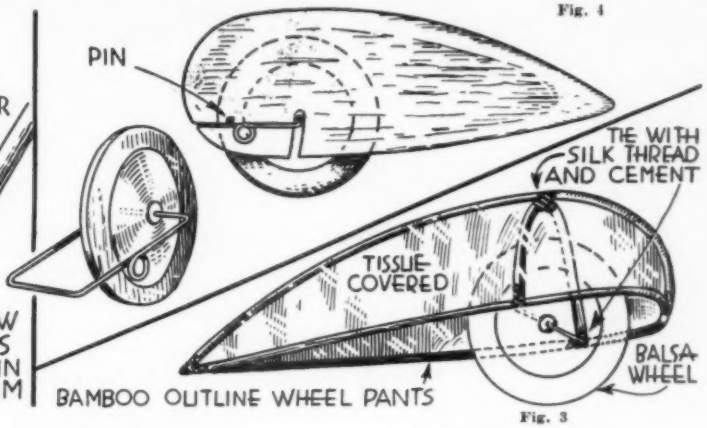


Fig. 3

Fig. 4

Solid Nose and Plug

BILL SILVER, 4930 N. Whipple St., Chicago, Ill., has a good idea for a solid nose and plug as shown by Fig. 1.

First, the nose is carved out of solid balsa to the shape required for the type of model being built.

A taper plug, carrying the washer, is now inserted into the nose piece, and being easily removable, is a very handy device. By slightly hollowing out around the hole, the nose can be made somewhat lighter than indicated.

The plug is made to the proper taper and is then worked into the hole by twisting it.

Balsa Rib-Stamp

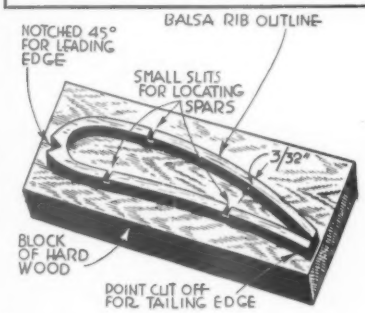


Fig. 5

MAKING a whole lot of ribs of exactly the same size is a tedious proceeding if they are all laid out separately and even when the wood is marked off to the outline by a simple pattern.

And to simplify this difficulty, we have the balsa rib stamp, Fig. 5, which was originated by George Froehlig, age 12, 187 Summit Ave., Bogota, N. J. This is getting 'em into production and is a remarkable achievement for a 12 year old lad.

A counterpart of the rib is fastened to a hardwood block, and the rib acts as the stamp after being inked by rubbing it over an ink pad.

Wheel Pants

HERE in the United States we call 'm "wheel pants" while in England they become "spats." Anyway you call them, they reduce the air resistance and help out the motor. If properly made, they should be as effective on a model as on a full size ship.

Now in Fig. 3, we show the "Featherweight Pants," invented by Gordon Christoph, 4911 Cornelia St., Chicago, Ill., a decided novelty in the pants line for model makers. They are at once, strong and light.

As will be seen in Fig. 3, this construction consists of a very light bamboo frame, fitted around the wheels, the frame afterwards being covered with tissue. The frame is triangular in section with the wheels placed directly under the deepest point.

For the support of the wheels at the axles, and as a former for holding the shape of the covering, a "U" shaped piece of bamboo is placed near the front end of the frame and is tied in place with silk thread as indicated.

At the lower end of the "V," the ends are connected with another thread that acts as an axle and shock-absorber for the wheel. The springiness of the "U" is very effective in absorbing shocks.

Simple Wheel Bearing

QUEER, isn't it, how simple, effective and cheap a part can be made if we only put our minds to work?

Now, Walter Trautman, Station D. R.-2 No. 252, Milwaukee, Wis., has devised a simple and light wheel bearing for model airplanes. He takes a hollow straw, grass or aluminum tube and uses it for a wheel bearing. See Fig. 2.

A wire inserted into the end of the chassis strut is then bent around to form the axle, and the wheel is held in place by washers as shown.

Shock Absorber

HERE'S a real shock-absorber for a model plane, and it really absorbs shocks without adding much to the weight of the model.

This is the stunt submitted by Harold Teifeld, 4939 N. Albany Ave., Chicago, Ill., and it should be of service to our readers. See Fig. 4.

It is simply a loop of stiff wire with an eye bent at about the center of one arm. A pin through the eye holds the device to the "pants." Try it. It protects the model.

Bamboo Bender

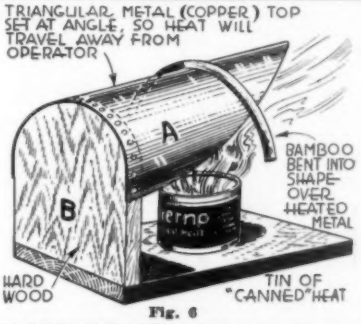


Fig. 6

GORDON TASEL, 3916 New England Ave., forgot to tell what town he lives in. Anyway, we thought so much of his ideas on bamboo benders that we decided to forgive the omission and run his device.

It is so simple that its construction does not require much explanation as will be seen from Fig. 6. A half-round of sheet iron heated by a Sterno lamp does the job—and does it well. The "Sterno" lamp is also called "Canned heat."

The shape of the metal hood or "anvil" directs the heat away from the operator, and is so shaped that the heat distribution is perfect and thus avoids burning the bamboo.

Building the Fairchild "24"

by

JOSEPH S. OTT

Model Editor

The completed Fairchild "24" is the most faithful copy of the full size machine that has yet been produced.

OF all the models that have been made into flying duplicates of the large plane, the Fairchild "24" is the first one that comes to an almost perfect scale that requires no changes.

The appearance of the finished model gives everything in detail, including the outside shape of the inverted motor with the propeller attached, the exhaust pipes on the under side of the fuselage, a short landing gear and a long rubber motor that requires no additional balancing with extra weights.

The completed model made perfect flights without any final adjusting of any kind. The total weight was one and three quarters ounces for the thirty inch size. Note the faithfulness of reproduction in its general appearance, which includes the long nose, the windshield, which extends over the top front part, the attachment of the wings and the landing gear and strut arrangement.

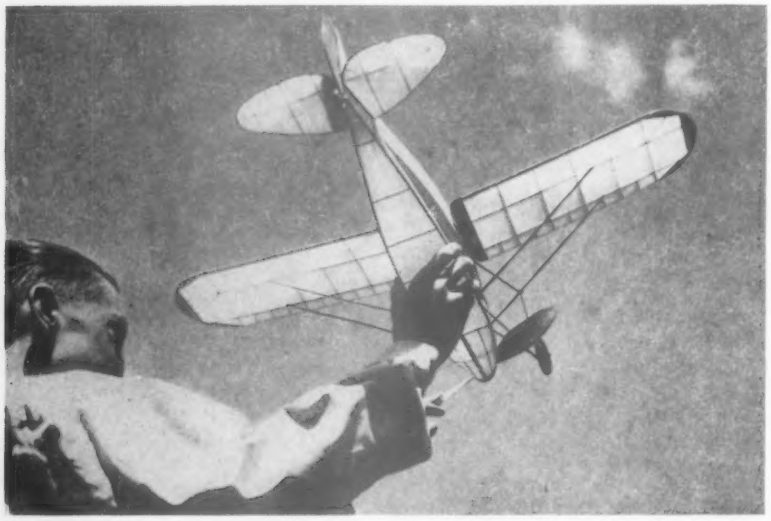
Wing Construction

The wing on the Fairchild "24" is built in two units and attaches on each side of the cabin, being cemented to the longeron on the top side. In reality there are two complete wings—one left and one right. That part which cements against the body is a solid piece of very light balsa.

The other end has the curve similar to the wing section, then it tapers both on the top and underside to a shape which is visible on the front view in the drawing. The spars project into this piece and continue to the tip of the wing.

In order to secure this block firmly against the longeron, cement a thin piece of bamboo completely across the top part of the brace on the body at two points about equal with the spares.

These bamboo strips are 1/32x⅛" in cross section and are forced into the end blocks on each wing, being cemented securely. In this way it will be impossible to break the wings off when the model strikes an object in flight or when landing. The wing tips are made of thin rib stock material. Tips of this type have a tendency to turn up or warp and to help prevent this trouble, small criss-cross bracing should be employed from the last rib to the tips and against the spars.



Showing the undersurfaces and the structure of the model through the semi-transparent covering.

Materials Required

Longerons—3/32x3/32x24"—balsa—10.
Cowling—1/16x1/16x24"—balsa—4.
Nose Block—1x2½x3½"—balsa—1.
Struts—1/16x5/16x12"—bamboo—8.
Exhaust—⅛x12"—straws—1.
Propeller—⅞x1x10"—balsa, firm—1.
Motor—1/32x⅛"x10'—rubber—1.
Wheels—2¼" O. D. diam.—balloon—2.
Shaft—.029" O. D. diam.—piano wire, trimmed—1.
Washers—⅛" O. D. diam.—brass—3.
Tail Wheel—1" diam.—balloon celluloid—1.
Windows—6x12"—celluloid, thin—1.
Leading Edge—⅛x⅛x30"—balsa—1.
Spars—1/16x⅛x30"—balsa—2.
Trailing Edge—1/16x3/16x30"—balsa—1.
Rib Stock—1/16x2½x30"—balsa, light—1.
Tissue—20½x24½"—Hakone, white—2.
Tissue—20½x24½"—Hakone, red—1.
Tissue-Stripling—6x24½"—Hakone, black—1.
Cement—large tube—clear—1.
Banana Oil—large jar—clear—1.

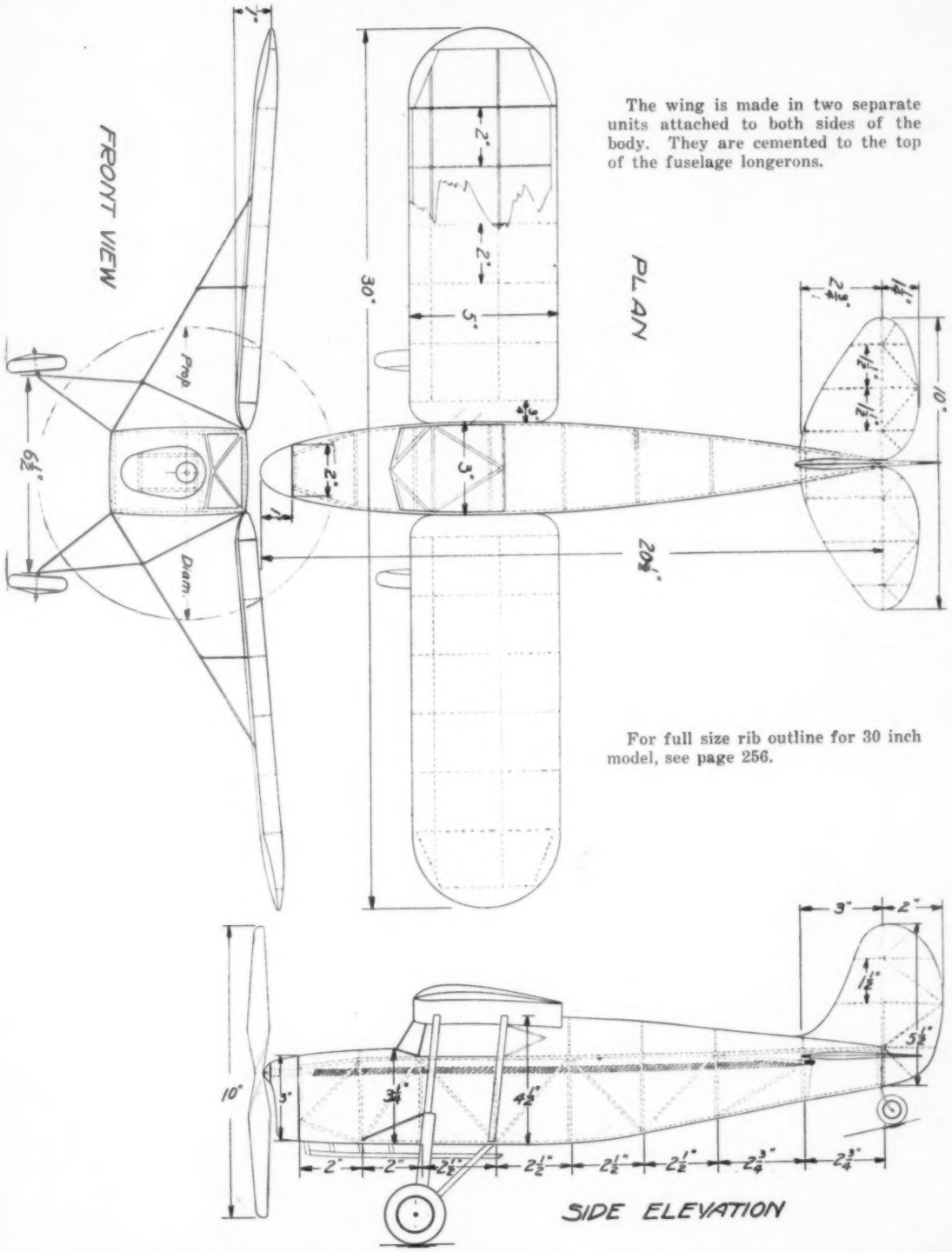
Body Construction

The entire body is square throughout its length with the exception of the

(*Continued on page* 256)

The Fairchild "24" Monoplane

A Flying Scale Model



The wing is made in two separate units attached to both sides of the body. They are cemented to the top of the fuselage longerons.

For full size rib outline for 30 inch model, see page 256.

Fairchild "24"

(*Continued from page* 254)

nose, which conforms to the oval shape seen at the front view. In this front view the largest section of the body is also shown with a small curved section on all sides, which is added to the third station from the nose.

No stringers are necessary, but a few may be added from the nose of the model to the third section. The amount of curve at this point is very small and the paper will lay up against this part and draw itself taut towards the next station to the rear. The angular bracing employed on the side of the fuselage assists in keeping the body very rigid and prevents the twisted motor from distorting the body and cracking the tissue after it has been applied.

The rear station, at the point where the motor is attached around the piece of balsa, is left uncovered on one side. The nose at the tip where the propeller is held in place may be made removable and an "S" hook can be added to the propeller shaft so that a winder may be used on the motor to assist in securing the maximum amount of turns. The exhaust pipes are made from soda straws and should be held in place with pins and cement, as the wax prevents the cement from drying in a short time.

Tail Unit Construction

The rudder outline is a continuous bamboo and a wide piece should be used piece of bent bamboo. Because of the long length required for the thirty-inch model it will be necessary to tie two pieces to complete the full outline. The inside construction is made with parts left over from the main wing or rib stock material. The parts may be sanded down so that the ribs are less than 1/16 of an inch thick. Angular bracing is employed in the rudder section and helps to prevent the rudder from warping after being doped.

The stabilizer outline is also bent when bending rudder so that sufficient material may be had for the left and right side. By using a wide piece and splitting so that two are secured from one bent section, both sides should be exactly alike. At the front end of the stabilizer that reaches into the body a small cross piece of balsa is glued against the last body station in turn against which the bamboo outline is cemented.

When cementing bamboo to balsa allow the bamboo part that overlaps to be approximately ½ to ¾ inch long. This part may be thinned down to decrease the weight, but it takes a length as mentioned to securely hold and prevent itself from tearing loose when receiving shocks and jars. So many connections are made where a small amount of bamboo, even as short as ⅛ inch, is allowed for a lap, which always breaks off and sticks out at the first little jar.

Tail Skid with Wheel

The tail skid is built of bamboo split in the middle and bent over a flame to allow sufficient room for the wheel to revolve freely. The bamboo piece when finished will look like a fork on a bicycle. A piece of wire may be used for this same purpose. Do not make the tail post too thick when attaching the skid. It is advisable to use some thin silk thread wrapping and cementing securely.

Covering

A combination of red and white covering is employed on the main wing as well as on the tail units. The rudder and elevators should be red and the vertical part and stabilizer parts white.

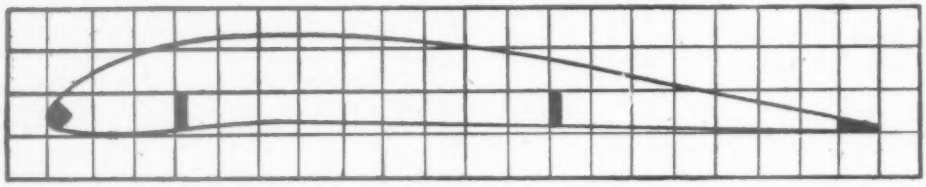
To increase the distinction between the red and white, making the division line very pronounced, put a ⅛-inch strip of black tissue at the point where the rudder and elevators would normally attach. This black strip is put on with banana liquid.

Good banana liquid will stick firmly and at the same time will not shrink the paper, thereby avoiding wrinkling at the points of connection. The underside may be entirely white.

The main wing is covered in a two-color fashion, similar to the tail with the exception that the red runs along the front side, starting at the first rib on the leading edge and ending off at the last rib at the trailing edge. The tip in this case will be white and the rest of the wing the same.

The wheels are red and all of the struts, which are made of bamboo, are lacquered black. The exhaust is painted black. The propeller is finished in silver with red tips.

END



Full size rib drawing for the 30 inch model. The squares enable you to reproduce the curve properly.

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1/16x1/8" ....24 for 5c
3/32x3/32" ....24 for 5c
1/8x1/8" ....24 for 5c
1/8x3/16" ....24 for 9c
1/8x1/4" ....24 for 12c
3/16x3/16" ....24 for 13c
3/16x5/16 ....24 for 16c
1/4x1/4" ....24 for 17c
1/4x1/2" .... 4 for 5c
5/16x5/16" .... 4 for 5c
1/2x1/2" .... 4 for 10c
1/2x1" .... 1 for 5c
1x1" 9c
1x2" 18c
2x2" 25c
2x3" 35c
2x6" 50c
3x3" 45c

Sheet Balsa 18" Lengths

1/32x2" .... 5 for 7c
1/16x2" .... 5 for 7c
3/32x2" .... 4 for 7c
1/8x2" .... 4 for 7c
3/16x2" .... 2 for 9c
1/4x2" .... 2 for 10c

BALSA LOGS

2x4x36" 53c
1x6x36" 40c
2x6x36" 80c

PROPELLER BLOCKS

3/8x1/2x5" .... 6c dos.
1/2x3/4x5½" .... 10c "
1/2x3/4x6" .... 11c "
5/8x1x7" .... 15c "
5/8x1x8" .... 20c "
3/4x1¼x9" .... 22c "
3/4x1½x10" .... 28c "

Bamboo

1/16"x1/4"x15" .... 8c dos.
1/16" squ. x15" .... 3c dos.

Celluloid Wheels: ¾" dia., pair. 4c; 1" dia., pair. 6c; 1¼" dia., pair. 8c; 1¼" dia., pair. 12c; 3" dia., pair. 25c

Celluloid Pants: Large, pair . . . 25c; Small, pair . . . 14c; Cowls, each . . . 20c

Celluloid Motors: 2 Cylinders 1¼" dia. . . . . 16c; 2" dia. . . . . 23c; 3" dia. 25c

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Colored Dopes: 1 oz. 2 oz. Pt. can
8c 12c 75c
Black White
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Cement Waterproof: 1 oz. 2 oz. can Pt. 10c 18c 80c
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Curtiss Ship Board Fighter F9C-2

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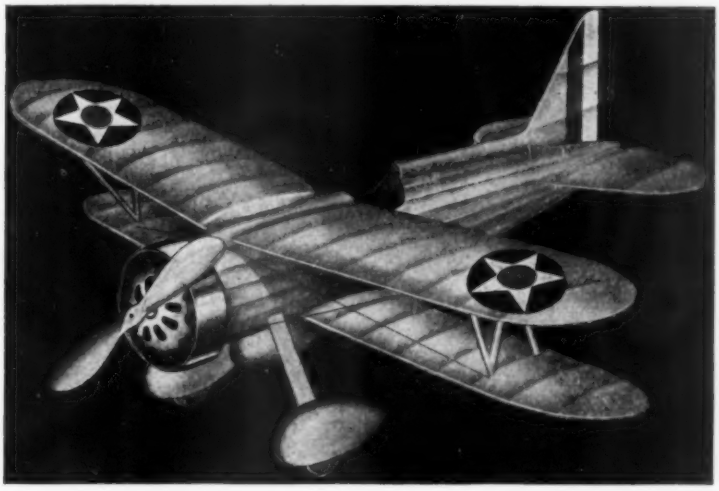

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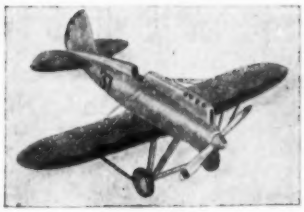
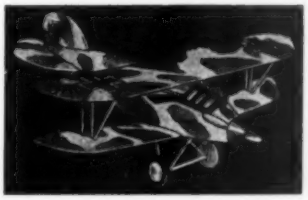
The Kit contains all parts, fittings and materials. Fuselage with Balsa Bulkheads; Built-up type Wings; aluminum Drag Ring and Motor Plate; new type carved Balsa Propeller; all Balsa parts printed and ready to cut to shape; all wire parts formed ready to use; cement; dope and everything else needed to build the Model, including Full Size Plans and Complete Instructions. Get your Kit now and build a model of this interesting little ship!



15—Howard Racer

13—Vought Corsair



16—Albatross

14—Boeing Fighter

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4—Laird	9—Hell Diver	14—Boeing Fighter	
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			20—Sopwith Camel

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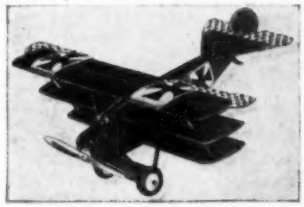

17—Fokker Tri-plane

18—Curtiss S. B. Fighter

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1/16 x 3/32	20 for .05
1/16 x 1/8	20 for .05
3/32 x 3/32	20 for .05
1/8 x 1/8	20 for .05
1/8 x 3/16	20 for. 09
1/8 x 1/4	20 for .12
3/16 x 3/16	20 for .13
3/16 x 5/16	20 for .16
1/4 x 1/4	20 for .17
1/4 x 1/2	3 for .05
5/16 x 5/16	3 for .05
1/2 x 1/2	3 for .10
1/2 x 1	1 for .06
1 x 1	1 for .11
1 x 2	1 for .20
2 x 2	1 for .30
2 x 3	1 for. 40
2 x 6	1 for .60
3 x 3	1 for .50

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1/32 x 2	5 for .08
1/20 x 2	5 for .08
1/16 x 2	5 for .08
3/32 x 2	4 for .08
1/8 x 2	4 for .12
3/16 x 2	2 for .10
1/4 x 2	2 for .11

PROP BLOCKS

1/2 x 3/8 x 5	2 for .01
1/2 x 3/4 x 5	dozen .10
1/2 x 3/4 x 6	dozen .11
5/8 x 1 x 7	dozen .15
5/8 x 1 x 8	3 for .05
3/4 x 1½ x 9	3 for .05
3/4 x 1½ x 10	2 for .05
3/4 x 1½ x 11	1 for .04
7/8 x 1½ x 12	1 for .05
7/8 x 1½ x 16	1 for .09

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2 x 6 x 36	.80

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.002 ..... per foot .12
.005 ..... per foot .11
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3 dozen ..... .10

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Each ..... .25

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1 dozen sheets ..... .10

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1/32" diam ..... 6 feet .03
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1/16 sq. ..... 2 dozen .05

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Stars in circle or bullseye (red, white, blue)
1" diam ..... 8 for .05
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CELLULOID WHEELS in all colors
½" ..... per pair .04
⅝" ..... per pair .06
1" ..... per pair .08
1¼" ..... per pair .12
1½" ..... per pair .25

ALUMINUM TUBING
1/16" O.D. ..... per foot .05
1/8" O.D. ..... per foot .06
3/16" O.D. ..... per foot .08

DUMMY MOTORS
9 cylinder
1½" diam ..... each .16
2" diam ..... each .23
3" diam ..... each .29

DRAG RINGS
1½" ..... .18
2" ..... .20
2½" ..... .25
3" ..... .27
3½" ..... .35
4" ..... .45

BANANA OIL
2 ounces ..... .07
Pint ..... .37

ACETONE
2 ounces ..... .06
Pint ..... .35

OPEN COWLINGS
1½" ..... .18
2" ..... .20
2½" ..... .28
3" ..... .30
3½" ..... .40
4" ..... .50

CLOSED COWLINGS
1½" ..... .18
2" ..... .20
2½" ..... .28
3" ..... .30
3½" ..... .40
4" ..... .50

BLACK CELLULOID PANTS
Pair ..... .25

SMALL PANTS
1¼" long, for 1" and ¾" wheels ..... pair .14

BLACK CELLULOID COWLINGS
Each ..... .20

COLORED DOPE
Colors: Orange, red, green, silver, yellow, blue, black, white, buff, navy grey, mahogany, olive drab
1 oz. bottle ..... .06
2 oz. can ..... .09
Pint can ..... .65

COLORLESS CEMENT
1 oz. bottle ..... .06
2 oz. can ..... .09
Pint can ..... .65

THRUST BEARINGS
Small and large sizes:
Each ..... .01½
Per dozen ..... .15

CLEAR DOPE
2 ounces ..... .07
Pint ..... .37

PARA RUBBER
No rubber over 5 weeks old
1/16 flat ..... 50 feet .12
225 feet .50
1/8 flat ..... 50 feet .13
225 feet .55
3/16 flat ..... 50 feet .17
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Red, blue, green, white, orange, brown, yellow ..... 5 sheets .10

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.014, .020, .028, .034 ..... 18 ft. 05

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STAR . . . . . ★
MODEL AERO SHOP
10-12 Pearl St., Newark, N. J.

Speed?

(*Continued from page 220*)

of helping these people out of their difficulty. A mechanical pilot would be a greater help to the aviation industry today than anything else that could be mentioned.

For the benefit of the layman or non-flyer a description of this would probably be in order. This mechanical pilot is a device that can be attached to the controls of a plane for blind flying. It should be so sensitive that the plane would be kept on an even keel at all times. A device of this kind, when it is perfected, will fly a ship through the worst storm in the country with absolute safety to the passengers. It would give the pilot time to use his radio and secure information as to the intensity and width of the storm he is flying through.

This may sound like a pipe dream to some of us, but sailors thought the same thing about mechanical steersmen until they saw several of them at work. Most of our big passenger liners of today are steered by these "Iron Mikes" as they are called and seamen swear by them—not at them.

Again, a non-flyer may ask why it is necessary to make an airport visible through several thousand feet of fog. The answer is simple. When a plane approaches an airport at night, several thousand feet in the air, it has between its landing gear and the ground, the same number of feet of fog. How do you think the pilot gets into the field? He waits for a "hole" and if one fails to show, he flies around until he finds a clear emergency field and lands there. With the airport outliner and a mechanical pilot this would not be necessary.

SLOWER landing speeds would be another boon to aviation, almost as great as a mechanical pilot. A 20 m. p. h. landing speed would end passenger deaths in the flying game for good and all. With a ship of this type, we could throw all the parachutes out in the ocean and leave them there. There would be no more need of all this talk of making a passenger wear one of these so-called "safety devices". Again one may ask why slow landing speeds would help.

With a ship of this type, a pilot could land on a city street and put the plane down with less bump than the passenger would receive if he or she "bailed out" in a 'chute. This ship could be dropped on the front lawn of the average home and cause very little if any damage. The passengers would receive no shock of any description from a forced landing in this type of a plane.

Most of our present day transports have a seventy mile landing speed and 130 m. p. h. cruising speed. The difference in the landing and cruising speed is just 60 m. p. h. Losing 60 miles of speed in the air is not a hard job and if the speed of the ship happens to fall below its landing speed the probable result would be a spin.

Now, in the case of our "safety ship", we would have to lose 180 m. p. h. of flying speed before the ship would spin. In other words, we would have to lose three times the amount of speed in the first ship. Too often the difference between your landing speed and your cruising speed is the difference between arriving at your destination or finding yourself on Cloud No. 7 with a harp in your hand.

And now for power-plants. The first man who gets the bugs out of the Diesel engine gets my vote for Congress. This is the coming power plant of aviation and the whole cockeyed world knows it. The gasoline engine has had its day and its crack-ups and the more I see of this engine the more I think that crude oil engines are the answer to an aviator's prayer.

If they do nothing else for the industry than to remove the fire hazard, they have made history.

A crack-up more or less, if properly handled can cause little harm, but when you have a crack-up with a fire that's a different story. Fire is on the mind of every pilot when he comes in for a forced landing and when you take away this hazard, you free the pilot's mind and allow him to concentrate on the job at hand.

COME on some of you inventors—do your stuff! Aviation needs some of your best efforts right now and I don't mean maybe or but. Things I have mentioned above may seem far fetched at this time but when they do come into the industry their simplicity will be amazing. In the next ten years, aviation is "going mechanical" and the man with an inventive mind who gets in today will be the man who will reap some of the millions of dollars that are to be spent for this kind of equipment.

END

2 Sensational Kit Values . . . 99c each Post paid

Post & Gatty's LOCKHEED VEGA
10 inch Solid Model
Similar to Amelia Earhardt's Trans-Atlantic Plane

Complete with semi-finished propellers, finished wings, finished fuselages with drilled cockpits, finished stabilizers and rudders, semi-finished parts, finished wheels, with full size blueprints, glue, and everything else required.

Complete Kits for Solid 10" Models of Lindbergh's Lockheed Sirius (with or without pontoons) 99c ea. P.P.

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Carried in Navy Dirigible "Akron"
This is a Flying Model

12" FLYING MODEL. Having gulled wings. World's snappiest pursuit plane. Still a govt. secret.

Complete with balsa, bamboo, tissue, dope, plans, etc. and all necessary materials. 12" model, 99c p. p.; 18" model, $1.25 p. p.; 24" model $1.50 p. p.

Remit by check, postal or express money-order.

RIPIN MODEL AIRPLANE CO.
915 Franklin Ave., Brooklyn, N. Y. (Dept. P-10)

If Michael Angelo had been a model airplane builder-

he would have enjoyed building Cleveland-Designed models. He loved details—he loved to do things right. One day when someone told him not to bother so much with details, he answered in kind: "It's the infinite care of the details that makes the finished job perfect." We of Cleveland second that motion. And so when model builders and even model concerns say about us that our models, and particularly the photos of them, look too real—look too good to be true—we simply answer that they don't look too real to **us**. In fact, we're always endeavoring to make them look and be more realistic. This whole business with us is very much of a scientific hobby and we believe there are thousands of other model enthusiasts who love to do things as perfectly as possible. So you know that all photographs on this page as well as all the photographs used in any of our advertising of scale models are of the actual Cleveland-Designed models themselves, not retouched photographs of the real airplanes as skeptics are inclined to believe. They should build a few of these models to see the truth of our statement of the actual models looking even better than the photographs (not only because of the coloring but also because of the many details which cannot all be seen on the photographs). Contrary to the practice of many advertisers, we do not retouch photographs to bring out artificial beauty (?) covering the entire photograph in the process so that it looks like a hand-drawn sketch. We are proud of our productions and give our artists strict instructions not to "doll up" photographs, only backgrounds, to place in clouds or landscapes and to brush over the small bead to give the appearance of the propeller whirr, except where details fade into backgrounds and where uneven splotches of coloring are magnified by the powerful lights which reflect through the surfaces.

Here's a Real Bargain Offer

For those who want drawings only. In order to give many of those who do not know what Cleveland-Designed models are like, but only wish drawings, we have had specially printed drawings of two of our largest models, the DeHaviland-4 Battleplane, and the Curtiss JN4D Training Plane. Drawings alone each 35c or two for 50c. Postfree. No other drawings available. This is just another introductory offer at a still cheaper price so that everyone has a chance to see what Cleveland-Designed models really are like. While they Last.

SEE WHAT $1.95 WILL BUY

HERE'S a brand-new way of offering Cleveland-Designed flying kits with **balsa wood all printed out** for you, strips all cut to the proper thicknesses and accurately, only as Cleveland can. The drawings are accurate to the ¾" scale, all the details worked out and very explicit. Even the dummy motor which we now employ is easy to make with the necessary balsa parts all printed out (the ring being cut from flat stock for accuracy and detail). Plenty of cement and paper cement (or B.O.), two bottles of the newly perfected Cleveland Pigmented Model Dopes (beautiful opaque colors now), etc., etc., are supplied, to say nothing of all the little things like Japanese paper, music wire, iron hinge wire, simple to assemble Cleveland-Designed hubs, indestructible fibre propeller parts, right down to the last detail of thread for brace wires, for Cleveland Model & Supply Co. is the home of complete kits that ARE complete and of quality far beyond the average.

BOEING XP936

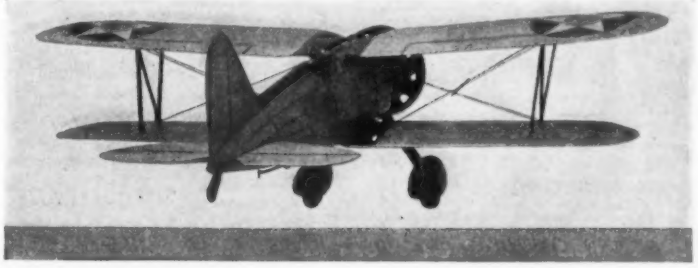
Illustration Shows It Climbing on The Turn Note The Complete Motor and Ring

This is Boeing's brand new fighter which is on the Army "Secret List." So new that it still has the "X" letter designating it is an experimental Pursuit job. It is a radical departure from the usual U. S. fighting aircraft, being a low wing design. It is capable of well over 225 MPH. The model is detailed as authentically as possible with its numerous little gadgets, the P-W Wasp motor and Boeing end ring which you easily make, etc., etc. One of the finest and most detailed of all Cleveland-Designed models. Due to its fairly large wing area, its flying qualities are excellent. Being a ¾" scale model, its span is 20¼", length 17⅞", weight 2.5 oz. Colored yellow wings and tail surfaces, everything else olive drab except the few details which may be colored black with ink. Price for the entirely complete **Kit SF-23**, all balsa printed out, etc., postfree, **$1.95**. Insurance 5c extra.

AKRON FIGHTER F9C-2

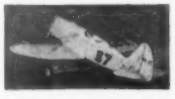
Illustrations Show It Coming In For A Deck Landing With Hook of Cleveland's New Arresting Gear Dropped In Place, And Also Taking Off. (Deck Level Photos.)

The U. S. Navy's newest and smallest Curtiss fighter. It is Cleveland's new beauty destined to be the successor of the Laird Super-Solution for beauty and flights and almost everyone knows of the Cee-Dee Laird SF-5 (which sells at $2.50). It is a very consistent flying model and a real beauty in appearance. Detailed only as Cleveland details its models, including authentic gull shaped upper wing at the proper dihedral angle, the two leg landing gear which is very strong when built as Cleveland designs 'em, windshield sights, etc. All balsa comes printed out on flat sheets including curved parts, dummy motor, motor end rings, wheels and all—easy to build Cee-Dee ships now! Neither this ship nor the new Boeing are at all hard to make if some model experience is had. The fact is that they are about as simple as the Howard to build, but having more parts the same as the simple Gee-Bee model, take longer. Being a ¾" scale model, its span is 19½", length 15⅛", weight 2.2 oz. Colored silver wings and tail, everything else blue except details which may be colored black with ink. The kit comes complete with everything needed for only **$1.95** postfree. **Order Kit SF-22.** Insurance 5c extra.



The Gee-Bee and Howard All White Racer Models Still Going Strong

The Gee-Bee is still an extremely popular model—record flight by a Canadian man 962 ft. For the price of $1.50 you get an accurate ¾" scale model, span 17½", length 12", weight 1.5 oz. Colored yellow and black. Complete Kit SF-17 with everything needed **only,$1.50** postfree.



The Howard Racer model is still being sold at the price of $1.00 complete **including all materials, dopes and drawing.** This, as all our SF models, is ¾" scale. Span 10", length 13½", weight 1 3.10 oz. Complete **Kit SF-18,** including everything needed, mailed postfree anywhere for **only $1.00.**

Seen It?

Have you seen the latest CME Technical Bulletin for Cleveland Model Engineers? If you're a regular Cleveland customer, you receive this without charge, but if you're not, 5c will start bringing copies to you until you do become a regular customer. It is fully and generously illustrated with Cleveland's great line of 43 wonderful models. Every one authentic—all fly marvelously. Send for it today if you have never received a copy. Especially needed by men and boys who are beginning their winter model work or those who have recently joined school clubs. Send 5c for your copy today.

If your dealer can't supply you, order direct, giving his name.

CLEVELAND MODEL & SUPPLY CO.,
"Where Complete Kits ARE Complete"
1866-PA10 West 57th Street, Cleveland, Ohio, U. S. A.

Gentlemen:

Enclosed find..... for the following items which I have checked:

Kit SF-23	$1.95.....	DH4 drawing	$0.35.....
Kit SF-22	1.95.....	JN4 drawing	.35.....
Kit SF-18	1.00.....	Both drawings	.50.....
Kit SF-17	1.50.....	CME News	.05.....
	Insurance	.05.....	

Print Name.....

Address.....

City.....State.....

Age.....yrs. Model Experience.....yrs.

I am pinning to this coupon a list of the models I would like to see Cleveland-Designed, especially at the new low prices for which Cleveland designs authentically.

CLEVELAND MODEL & SUPPLY CO.
1866-PA10 West 57th St. Cleveland, Ohio, U. S. A.

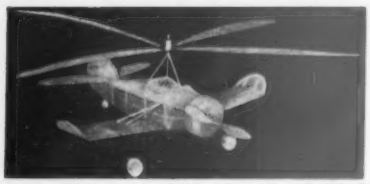
New! First Time Offered!
STINSON AIRLINER

26½" WING SPAN ● TRI-MOTORED

We have received numerous requests from boys asking us to design a Stinson ten-passenger tri-motor. Now, after much planning and testing, we are able to offer one at a very reasonable price. Kits contain:

Ribs, Bulkheads, fairings, pants, and other parts clearly printed on balsa wood; 3 finished, turned, complete balsa wheels with bushings; Ready-shaped propeller; Letters for top and bottom wing and rudder, ready cut out and gummed; All wire fittings ready formed; 1 oz. banana oil and colorless cement, and special colored dopes; 2 large sheets of fine tissue; bamboo, rubber motor, and all other balsa stripe cut to size. Wing Span 26½", Length 17½". Weight, 1 oz. Colors: Dark Green and White. Complete..... **1.50** Post Paid

2-FOOT KELLETT AUTOGIRO



One of America's most popular models. It works on the same principle as the original ship. Complete with everything (all ribs, wingtips, bulkheads, etc., stamped on sheet balsa). Full size plans and instructions. **1.50** Post Paid

GEE BEE SPORTSTER D
2-Ft. Wing Spread

A winner for sturdiness and balance. Flies beautifully. Complete with full size plans (necessary parts clearly printed on balsa), and everything to build a perfect Gee Bee. **1.25** Post Paid

MONOCOUPE —110— 2-Ft. Wing Spread

The model that boys want, a true to scale flying model of famous plane. Kit contains everything for a complete Monocoupe (essential parts printed on balsa), full size plans and instructions. **1.25** Post Paid

15" FLYING SCALE MODELS

SE 5 British Pursuit—Fokker Triplane—Spad—Lockheed Vega
Complete in every detail.....Sent postpaid 99c each

Scientific Double Geared Winders. New, Large size .. **50c**

American Beauty Winders with automatic counters attached, complete..... **3.50**

Model Supplies at World's Lowest Prices

36" Scientific Balsa	**Colored Dope**
1/16 x 1/16...1c 8 for 5c	Large 2 oz. can.....12c
1/16 x 1/8....1c 7 for 5c	**Banana Oil**
3/32 x 3/32...1c 6 for 5c	Large 2 oz. can.....10c
1/8 x 1/8....1c 6 for 5c	**Colorless Cement or (Amber color)**
36" Sheet Balsa	Large 2 oz. can.....16c
1/32 x 2..4c 1/16 x 3. 9c	**Japanese Tissue**
1/32 x 3..8c 1/8 x 2.. 6c	For the commercial ship
1/16 x 2..5c 1/4 x 2..10c	Sheet 20½ in. x 24 in... 5c
Propeller Blocks	**Scale Model Tissue**
3/8 x 1/2 x 5..... 1c	Sheet 21 in. x 25 in..2 for 5c
1/2 x 5/8 x 6.....3 for 5c	**Scientific Rubber**
5/8 x 1 x 8.....2 for 5c	.045 sq., 1/16 flat, 3/32 flat, and 1/8 flat.....3 ft. for 1c
1 x 1-3/8 x 12..... 9c	
Thrust Bearings	
.025 and .035 hole each. 2c	
Acetone	
Large 2 oz. can.....10c	

Add 15c to all supply orders up to $1.50; above $1.50, add 10%

FREE: Complete Price List. Send 5c to cover postage.

OUR KITS AND SUPPLIES ARE ON SALE AT LEADING DEPARTMENT AND TOY STORES

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277 Halsey St. (Dept. P-10) Newark, N. J.
WORLD'S LARGEST MANUFACTURER OF MODEL AIRPLANE KITS AND SUPPLIES EXCLUSIVELY

Airy Chat

(*Continued from page* 210)

THEY are still parading the stratospheric planes around in Europe, but so far they have flown them about everywhere except in the stratosphere. Seems as though there were a lot of technical difficulties that have not yet been overcome.

* * *

THE Goodyear blimp "Puritan" is now a resident of Chicago where it is doing all sorts of publicity stunts. As I write this paragraph, it is passing my window with an advertising trailer streaming out behind it. On Saturday afternoons and Sundays, it is carrying passengers from the Pal-Waukee airport at three bucks per carry, and it is a mighty nice trip at that.

* * *

RIGHT here is the place for a paragraph about passenger carrying rates in and about Chicago. Five years ago, five dollars was the average charge for a ten-minute ride in an airplane. Then it went down to three dollars and then two dollars. Starting last summer, it was common to see signs marked "Airplane Ride $1.50." And this summer we see any number of fields with the sign "Ride—$1.00." Last Sunday we saw two or three fields that were offering rides for 50 cents. How these birds can make expenses at $1.00, much less at 50 cents, is more than I can see. The insurance and depreciation amount to this much, to say nothing of the gas and field rental. This sort of cut-rating does no one any good, and history shows that it never has done so.

* * *

AND we are still paging careless authors who have submitted manuscripts without attaching their names or addresses. There are two authors of articles appearing in our last issue for whom we are patiently waiting to send in their address.

* * *

ABOUT umpty-teen of our readers have written in from time to time requesting dope on wing areas and horsepower required for flight. To meet this demand, the writer has worked out two charts that appear in this issue which arrive at results empirically.

Our charts are compiled from the wing loading and power loadings of ships in commercial production, and the figures have not been arrived at by theoretical considerations. Of course, this can only be approximate without knowing the nature of the wing sections and other data, but it is a fairly good guide for a preliminary estimate.

* * *

CHARLES CHANDLER, Chicago, Ill., writes in to relieve his mind on a vital subject. Here we go—

Dear Ed—It seems to me that the state laws are not altogether to blame for the present stagnation in amateur aviation, nor can we blame the much discussed depression for it—at least altogether.

Where the rub really lies, in my opinion, is the high cost of engines, instruments and accessories. The prices that they are charging for a dinky little engine are ridiculous and when it comes to buying a few simple instruments, the price is enough to sink a ship.

For most of us and I hold a good job myself, it is almost out of the question to pay $450.00 and upward for an engine with enough ambition to yank a good substantial ship up into the air.

True, I've flown with Ford, Chevvy and motorcycle engines at one time or other, and have seen others fly them, but what I really want is a good, well-built aviation engine costing about $250.00 that will really run up performance according to my ideas of performance. To be able only to take-off the ground by the skin of my teeth is not to my liking. And the depression has nothing to do with this.

To me, the instrument board of an O.C. two-seater represents a veritable fortune in instruments. I wonder when the makers will get down to earth and give us something beside deluxe stuff? Then comes the exorbitant prices set on air-wheels, radiators and all the rest of it.

* * *

ONE thing that is very pleasing to us is the ever-increasing number of letters from our readers who are located in foreign lands. We have letters from England, France, Germany, Sweden, Italy, Russia, Cuba, Canada, China, Japan, Mexico and even from Egypt. Our foreign list is certainly growing fast.

* * *

IN THE September issue, we intentionally revived the old, old contro-

CURTISS SUPER HAWK

2-FOOT FLYING SCALE MODEL

Construction Set

$1.50

Here is the most sensational value in model sets. Complete with finished propeller, nickel plated exhaust pipes, insignia full size drawing and materials.

Boeing Low Wing X936—
30" Set.....$3.50
Bellanca Monoplane, 26" Set 2.10
Howard Racer, 15" Set..... 1.00
3 and 6 Cyl. Air Motors. Gas Motor. Send 5c for new catalogue.

MINIATURE AIRCRAFT CORP.
83 Low Terrace, New Brighton, N. Y.

versy regarding the death of the German ace Boelcke. There have been so many conflicting reports on this matter that we considered it timely to revive the dispute and see whether or not our readers would settle the matter once and for all. Carl B. Ogilvie ably defends his statement in this issue.

As a matter of fact, there are many such wartime points in dispute, and from what I have seen, they will always be in dispute. One witness views an incident from one angle and another equally sincere and honest witness of the same episode sees it from another angle.

Just as an example of this sort of thing, I once witnessed an accident at an airport exhibition staged before thousands of spectators and yet I could not find two people in my vicinity who could be found to agree on all the details of that accident. If it is so difficult to get an agreement from closely observant spectators at an air-meet, how much more difficult it must be to get agreement among the observers during the uproar and confusion of battle!

* * *

AND now, turning over the letters received today, I find a very interesting letter from a real old-timer, J. B. Oberthier, Plainview, Tex., who has been a follower of POPULAR AVIATION from its first issue. He comments very graphically upon the growth and progress of this magazine, step by step, and for this reason believe that his letter will interest some of our new readers.

I have been a news stand reader of POPULAR AVIATION *for a number of years and will say it is one of the best Aviation Magazines on sale anywhere. I am very much interested in gliders and have been for a number of years. In fact, I built one and got a number of very good flights out of the glider before I finally wrecked the wing.*

I always keep all my aviation magazines filed away so that I can refer to them at any time. Upon going through them the other day I ran across the first issue of POPULAR AVIATION *and thought some of the new readers might like a brief review of old* POPULAR AVIATION'S *first issue.*

Your last issue of August, 1932, *makes five years for P. A. and very successful years, I think. However, the period in which P. A. became "Aeronautics" I did not like so well, in fact I quit buying the mag because it published articles for the larger operator and let the beginners go.*

Vol. 1, *Number* 1, POPULAR AVIATION, *August,* 1927, *I now hold in my hand and as I glance at the cover I see the plane of Col. Lindbergh being escorted to a landing by two planes. Below are people, some on the hangar roof, even some have climbed upon the wind sock pole to get a better view.*

As I turn over into the Mag, I find an editorial "Popularizing Aviation,"

LOOK–FELLOWS–LOOK

Model Aviator—Featherweight Motor

NOW ONLY 99c Complete Formed Kit

Air-planes Boats Perfect Air Motor

Half Finished Air Motor.....$1.45
Finished Air Motor.....2.95
Air Container Kit.....2.95
Wire soldered around cylinder.
Finished Air Container.....4.95

10c each—Model Plane Plans—10c each
S.E. 5—Mystery "S"—Stinson—Vega—Fokker Triplane—Rocket—Fokker Amphibian—Nieuport—Spad—Albatross—Boeing P-12B—Sopwith—Tiger Moth—Gloster IV—Alsaldo Pfals—Bernard—Fokker D8—Super Marine—Ott Hydro—Orion—Hawk P6E—Hell Diver—Gee Bee—Laird Super
3 Plans for 25c postpaid

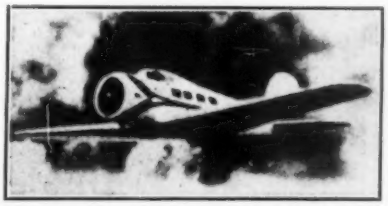
Dealers write for large discounts on plans and other merchandise.

BABY HYDRO STEPPER. Plan.....$ .10
Wood Parts for Baby Stepper.....1.90
Shaft-housing Propelier and Rudders.....1.75
Two air container kits for Baby Stepper, including all necessary valves.....3.45
One complete set of K. D. parts for the Baby Hydro Stepper, including every item, also motor, to finish the working model, p.p.....8.00
Catalogue and one plan.....10

MODEL AVIATOR PRODUCTS
3335 Eastwood Avenue, Chicago, Ill.

FALCON ADVANCED MODELS hold the distinction of being the most complete ever offered. The reason? We include, besides plenty of grade A material, every known feature and device to make our models the most beautiful and best flying on the market. (Notice Monocoupe features).

THE PRIME MOVER—a new, gearless, patented device for doubling the endurance and increasing the all around performance of model aircraft—is included in each ADVANCED MODEL kit. Weighs only 1-40 ounce. Yes—we also retail them, packed in individual boxes, 40c each postpaid.



MONOCOUPE 110

MONOCOUPE FEATURES—Prime Mover; Cell. Dummy Motor; Spun Aluminum Ring; Aluminum Cowl Plate Cell. Balloon-type Wheels; Special Model Airplane Color.

Winner of many National Air Race events. The model is a natural record breaker without the prime mover, but with this marvelous device its performance is practically doubled. Kit for this 18" wing span model contains, besides the special features named, full size detailed drawing, large folder of instructions, and generous supply of material. Kit postpaid..... $2.25

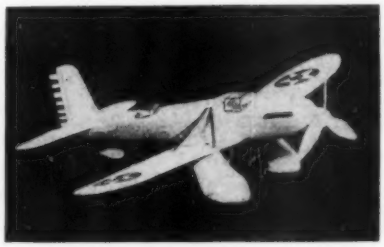
When our models are placed upon realistic backgrounds, it is practically impossible to tell them from the real ships.

LOCKHEED ORION

Fastest and most modern commercial plane—the Lockheed Orion 200 mile an hour supertransport. This 18" wing span model faithfully reproduces its original both in appearance and flying ability. Kit contains such features as prime mover, spun aluminum cowl, balloon-type wheels, retractable landing gear and special airplane color. Full size drawing, detailed instructions, and plenty of material. Kit postpaid..... $2.25

And for those who like indoor ships . . . . . SUPER MIDGET MODELS

AKRON FIGHTER



A-8 ATTACK

These 9" wing span, flying scale models use a new type of construction, making them easily and practically non-breakable.

50c Each kit (2 planes) postpaid. | Any 3 kits (6 planes) postpaid. $1.35

For example: The Akron Fighter kit contains sufficient material to build two Akron Fighters and costs 50c.

Curtiss Hawk P6E
Akron Fighter
A-8 Attack
Gee Bee Racer
Lockheed Vega
Spad
S.E. 5
Hawker Fury
Curtiss Helldiver
Boeing P12C
Ben Howard Racer
Lockheed Sirius
Fokker D7
Albatross D3

Send stamp for price list of supplies. Astounding discounts to dealers and clubs!

Falcon Model Airplane Co. 9610 Division St., Portland, Oregon

Most Easily Built Model on Market
This realistic 12-inch model Sopwith Fighter will rise off ground and fly 150 ft. or more consistently. A steady flyer indoors or out. Set includes aluminum propeller, brass shaft, rubber band motor, streamlined wheels, nose-block, ready-cut struts, etc. Clear building and flying directions. No tools needed. Simplified construction makes this most easily built model on market. Can be made in two hours and will give more real satisfaction than expensive sets. Mailed in unbreakable container, postpaid in U. S. and Canada, only 50c. Order yours today.
New Motor Gives Longer Flights

The Midland Model Works, Dept. V, Chillicothe, O. (No stamps or C.O.D.'s. No catalogue. Please give full address.)

SMOOKLER SUPER SAVINGS SALE

AVIATION HELMETS

$1 Including FREE EAR PUFFS
Made of white washable gabardine with non-rip seams. Goggle straps and chin buckle. Inside pocket for ear puffs. $2.00 value.

50c Special—White Twill Cloth Helmet. Light weight. Ideal for air hop passengers—or souvenirs at air meets. Quantity price—$25.00 per hundred. Rubber stamped with name of airport, $2.00 extra.

$1.50 HELMET—Black leatheroid—feels like genuine leather.

$2.00 HELMET—Select black leather—fleece lined—eyelet ear vents—adjustable fasteners with goggles, $2.50.

$2.50 HELMET—**Capeskin**—Brown or black—Unlined. With ear puffs, $2.75. Regular $3.50 value.

$3.00 Same as above, including acoustic ear vents.

$3.50 Finest black or brown—**Capeskin—Chamois lined**—with ear puffs—$3.75, including acoustic ear vents. Regular $4.50 quality.

SPECIAL ACOUSTIC EAR VENTS
Acoustic Ear Vents admit all sounds and exclude all dust and foreign matters. Helmets are lock-stitched, with double strength thread.
Sent prepaid or C.O.D. plus postage. (No C.O.D.'s to foreign countries. We do not issue catalogues.)
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BALSA These new prices on A-1 grade balsa cannot be equaled. (All Balsa 24" long unless otherwise specified.)

Strips

1/32 x 1/16	9 for 2c	1/32 x 2	5 for 8c
1/16 x 1/16	9 for 2c	1/64 x 2	5 for 9c
3/32 x 3/32	9 for 2c	1/20 x 2	5 for 8c
1/8 x 1/8	4 for 1c	1/16 x 2	5 for 9c
1/8 x 1/4	2 for 1c	3/32 x 2	5 for 11c
1/4 x 1/4	3 for 2c	1/8 x 2	4 for 12c
1/4 x 1/2	3 for 4c	3/16 x 2	3 for 12c
1/2 x 1/2	3 for 8c	1/4 x 2	2 for 12c
1/2 x 1	2 for 9c	5/16 x 2	2 for 13c
1 x 1	1 for 8c	1/2 x 2	1 for 10c

Balsa Planks

1 x 2 x 24	15c
2 x 2 x 24	20c
2 x 3 x 24	25c
2 x 4 x 24	35c
2 x 6 x 24	50c
2 x 3 x 40	45c
2 x 4 x 40	60c

Para Rubber
A fresh supply always.
1/32 sq. 50 ft. 7c; 100 ft. 13c
3/64 flat 50 ft. 9c; 225 ft. 40c
1/16 flat 50 ft. 12c; 225 ft. 50c
1/8 flat 50 ft. 13c; 225 ft. 55c
3/16 flat 50 ft. 18c; 225 ft. 75c

Jap tissue Grade A, 2 sheets 5c; Grade B, 2 for 3c; Colorless cement, large 4-inch tube 8c, Pint, 60c; Piano wire No. 4-18, 10 ft. 3c; Washers, 2 dz. 3c; Winders, double geared, 30c each; Bamboo, 4 pieces, 1c.

Celluloid Parts
9 cyl. Dummy Motor, 3" diam., 28c; 2" diam., 20c; 1½" diam., 15c; Pants for ¾ or 1-inch wheel, 14c; for 1¼ or 1¾ inch wheel, 25c pair. Wheels, ⅜" diam., 4c pair; 1" diam., 6c pair; 1½" diam., 8c pair; 1¾" diam., 12c pair. Cowlings, 20c each.

KITS 15-inch Models that make dandy flights. (Postage 6c on each Kit.) **60c ea.**

S.E. 5; Texaco, 13; Stinson Mono.; Lockheed Vega, Fokker Triplane; Nieuport Baby Scout, S.P.A.D.; Albatross D 111; Boeing P 12 B; Sopwith Camel; D. H. Tiger Moth; Gloster IV Seaplane; Ansaldo; Pfals Pursuit; Bernard Pursuit; Fokker D VIII Supermarine Racer; Gee Bee Racer; Laird Super Solution; Curtiss Hell Diver; Hawk P. C. E. Lockheed Orion, P. Z. L. IV Polish Pursuit.

SCRAP KITS, $1.00 value . . . 25c each

Send for Free Price List containing full line of materials. 10% Packing and Postage charge with all orders. (Add 10c extra for packing on all wood orders for less than 50c).

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and across the page the heading "The Outstanding Feat of the Ages."

On page 10 I find "The Second Great Hop" with a number of views of Chamberlin, Levine and their plane "Columbia," also Tempelhof Airdome at Berlin where the flyers landed. Page 13 brings another noted flyer into our review and this is no other than Commander Byrd (now Rear Admiral Byrd) with a picture of his plane "America."

"Aerial Photography and Surveying" and "A-B-C of Aviation" were both very good articles. Page 25 brings us to "Forecast and Prophecies." Among those prophesying are Col. Lindbergh, Bellanca, Orville Wright, Byrd, Chas. L. Lawrence, Levine and Chamberlin and even Mussolini.

On page 40 I find a very interesting picture of a Helicopter in flight built by a Mr. Garber of Washington, D. C. "Foreign News and Notes" contains some very interesting bits of news and some very good pictures. The last few pages contain a Dictionary of Aviation which was a great help in those days for everybody wanted to be up to the minute on his aviation.

I wish for P. A. many more years of continued success and best wishes on their fifth birthday.

Thanks. This letter is not only entertaining but it is very useful to us as it carries the reader's personal analysis of the magazine and the articles that appealed to him.

* * *

NO MATTER what else they accuse us of being, our most ardent enemy cannot accuse us of being "Yes Men" nor of "yessing" every asinine aviation project that comes along. If we believe that a thing is wrong we come right out and say so, and if we believe that a certain condition is a menace to aviation or the U. S. A. we yell all the louder. This is constructive. Silence or maudlin agreement with the self-appointed authorities on every point is mostly destructive.

And now we have received a wholehearted letter from L. P. Hoffner, Tiltonsville, Ohio, who understandingly compliments us on this attitude, and to whom we extend our felicitations.

You have my sincere congratulations in being the first publication that has the interest of aviation at heart, or in other words, the safety of the U. S. A., to the extent that you have a plan to offer that would really give this country a standing among the nations.

There is no doubt that you have a fight ahead of you to put your "Free Civilian Training" plans across, but the idea is one that will give the people of this country an air force that will be our only salvation if world conditions keep on in the way they are now headed.

When our best aviation minds make the statement that our national air defense is wrong it is time that something is being done about it, especially when such an expenditure of public funds is being used with practically no results.

The worst part of it is we could have all we need in the line of air defence, if the money now being spent was made to produce the way it should, and to think that we are getting nothing worthwhile out of it, is enough to make anyone with any honesty, "fighting mad".

Why is it that good business men, so many times, upon accepting responsible government offices do not have honor enough to be as good business men for their fellow countrymen as they have been for the private business interests they have served in the past? From the looks of things, almost invariably, our luck seems to be to get some business man in a big government job that has made up his mind to quit being honest, and resort to a government position to help him fill his pockets with public money through some dishonest scheme or other.

I am in favor of a plan that will put the U. S. A. where she belongs in regard to air defense and like Capt. Purcell, I think we need some laws to deal with those that are standing in the way of our national safety, as well as with hindering persons in connection with commercial airplane pilots.

I think your plan is a good one and deserves the support of everyone that thinks our country is worth saving for ourselves and our children.

With the presidential campaign now in full blast, action on anything except job hunting and political publicity stunts has been somewhat delayed, but we trust that this period will soon pass over so that we can, once more, get action on some more movements favoring aviation development.

* * *

Well, so long for this time—see you in the same place next month.—J. B. R.

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Ogilvie

(*Continued from page 238*)

In the particular case of Boelcke, while in Berlin, I translated his entire field book in order to get the minutest details of his war front experiences. I also visited surviving pilots of his famous *Jagdstaffel* and got the pertinent facts of his death from several eye-witnesses.

I have spent many years in collecting data for my air-war files and have traveled extensively throughout the United States and abroad to get accurate and authentic information. I have been most fortunate to obtain considerable information of British pilots through personal contact with them and their buddies and through the gracious courtesy of the British Air Ministry.

The French War Department has been most enthusiastic in its assistance as has the German Air Force and our own Air Corps in Washington, D. C. All of these air and war departments I have visited personally, not once but many times.

No, I didn't state Baron von Richthofen was a coward. I will say, however, that while I consider him one of the greatest man-killers, a remarkable pilot and an amazingly accurate marksman, that his tactics were neither chivalrous nor courageous. It doesn't require courage to go plunging down the battle ways to attack a slow two-seater.

Because of the very intricate nature of a dog-fight it is impossible to answer Wayne Linke in this letter. So that readers will not think I am trying to get out of explaining where all the Camels and Fokkers were when Roy Brown shot down Baron von Richthofen, I have written a detailed article, substantiated by British and German War Department reports and eye-witnesses' statements.

It is common knowledge that Germany made desperate efforts to regain control of the air and sent gigantic squadrons of anywhere from thirty to fifty planes soaring aloft as one mighty winged armada against the Allied Air Forces. In a forthcoming article, which I am now writing for POPULAR AVIATION, I tell of the amazing battle of one lone Canadian pilot against an enemy horde of between *fifty and sixty* planes! That remarkable pilot, who escaped alive after shooting down *six* of them, was the late "Billie" Barker of Canada.

Captain J. L. Trollope, another R. F. C. man, who was the first and one of the very few pilots to shoot down six enemy planes in a day, encountered 45 German planes. And the greatest air battle of the World War was fought over London at night; 174 planes participating.

Mr. Linke doubts my statement of German tactics of massing forty to fifty planes in one gigantic aerial attack. He goes further and states that in Gibbons' and Rickenbacker's books there is no mention "of a flight of fifty German planes, nor of forty nor thirty."

Mr. Linke has made an incorrect and untrue statement. I refer him to page 91 of Gibbons' book which states as follows:

"Twelve days after Boelcke's death, the Flying Uhlan (Richthofen) had opportunity to test the fighting capacity of the Jagdstaffel in an air battle, which, for the number of machines engaged, was the greatest that had ever occurred in the war up to that time. Eighty planes and more than a hundred knights of the blue, took part in that aerial tourney of death—at least, that is the aggregate of the estimates of both sides as to the strength of the enemy they encountered, although both the English and the Germans recorded that they were outnumbered by the other. The English reported the German planes as numbering forty, and Richthofen estimated the English planes at between forty and fifty. Each side admitted having about thirty of their own planes in the battle. As the majority of the machines were two-seaters it is safe to estimate that about one hundred winged men-of-war took part in the hostilities."

Again on pages 349-350, Gibbons writes:

"Morning and afternoon they (Brown's Squadron 209 R. A. F.) bumped into the Flying Baron's aggregation of gaily decorated Fokker triplanes and Albatross scouts numbering anywhere from twenty to fifty planes, and flying in various formations under a central command. Richthofen had developed mass manoeuvres for the air."

In his letter, Mr. Linke demands of writers—authority and accuracy. It is obvious that he did not take the time to be accurate before he took it upon himself to inaccurately quote Gibbons and Rickenbacker, as well as myself.

Yours for accuracy,
Carl B. Ogilvie.

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Bandits

(Continued from page 228)

rounded by bandits. Let Sergeant Heritage tell it:

"I left Puerto Cabezas as pilot of an amphibian with Corporal Simmons to patrol the district around Saclin where bandits had been reported. We reached Saclin in about an hour's flying time and while over the village were fired upon by bandits quartered there. We dropped several bombs but were unable to note their effect.

"While still in sight of Saclin, our motor quit and we landed in a swamp. Immediately we set fire to our plane after taking out our submachine gun, compass, maps and revolvers, and headed in the direction of Puerto Cabezas, some 50 miles away.

"Owing to the tropical jungle and swamps, which were full of alligators, our progress was slow. On one occasion we made only 150 yards in an hour and a half. Frequently the water was up to our shoulders and insects swarmed all around us, stinging constantly.

"We traveled all that day, the following night and the next day. We swam five rivers and almost all the time were forced to chop our way through the jungles with machetes. While crossing one of these we lost our machine guns and revolvers. They seemed to weigh a ton, anyhow. Having lost our weapons we were scared of the alligators and made no more stops from this point on.

"Altogether we must have traveled 50 miles with the bandits following us.

Very recently, a new signal system was developed by the Skeleton Brigade which makes for successful contacts between ground patrols and planes. It works thus: A patrol plane is on the lookout for a certain group of bandits but has difficulty in locating them.

Noting a ground patrol down below, the observer drops a weighted message asking: "Where are the bandits?" Whereupon the ground patrol displays a huge arrow, mounted on a panel, pointing northwest. The plane proceeds in that direction, drops a bomb or two and keeps the bandits in a state of terror and uncertainty until the ground forces have a chance to reach them and launch their attack.

Probably the most novel use of planes in this general connection took place recently when two pilots not only saved the lives of a handful of the Skeleton Brigade who had been entirely surrounded by bandits, but helped them to capture 25 saddled horses belonging to the outlaws!

News reached Puerta Cabezas that Lieut. Darrah and his Marines were being closed in by an overwhelming number of bandits at Logtown, only a few minutes trip by plane. Immediately two crack pilots, Lieutenants Young and Jack, with their observers, went to the rescue. They located the beleagured group and saved them from certain destruction.

They dropped bombs on suspicious looking shacks for the sound of the planes had caused the bandits to hide. All the while they kept a sharp eye on Darrah and his men, to make sure that no sudden bandit attack would annihilate them. One pilot returned to Puerta Cabezas for ammunition and food for the members of the Skeleton Brigade, while the other circled about the surrounded men. Two hours later, Darrah and his men, accompanied by

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his guard of two planes reached Puerta Cabezas.

The novel episode of the captured horses took place the following day. Hearing that Captain Wood was in a somewhat precarious position with his patrol at Moss Farm, not far from Logtown, and known to be filled with bandits, the two pilots headed straight for the region. Upon reaching the farm nothing could be seen of Wood, so the planes separated, Lieut. Jack heading north in the direction of Logtown, and Lieut. Young in the opposite direction. Young located Wood and his outfit about five miles south of Moss Farm, and escorted them back to the farm.

Meanwhile, Lieut. Jack had headed for Logtown where he saw a group of eight bandits loading horses with bundles. Upon seeing the plane, the bandits dispersed, some into shacks and others into the underbrush. Jack dropped bombs and opened up with his machine guns. After expending all his bombs, he flew back to where Young was circling about, signalled him and returned to Logtown with Young following. No bandits were in sight but some 25 saddled horses could be seen wandering about, so Young decided to kill them, hoping thus to hamper escape.

Then the idea occurred to him that perhaps Captain Wood and his patrol could capture these well equipped animals and make good use of them. However, without plane assistance it would be necessary for Wood to hike several miles, under constant danger of attack, from Moss to Logtown.

Young then flew to Captain Wood at Moss Farm, leaving Jack to watch for any bandits who might try to leave the vicinity. He dropped a message to Wood describing his plan to capture the horses, and advising a forced march to Logtown, one plane to guard him all the way while the other kept a sharp lookout at Logtown. Young then returned to Logtown to carry out the latter mission while Jack went back to Wood and escorted him until he reached Logtown, almost two hours later with his troop.

Upon entering the town, the Skeleton Brigade found things as they had surmised. Some bandits were in houses and others were hiding in the bush, apparently waiting for the planes to leave so they might regain their horses. As the patrol entered the town, Young flew very low in an effort to gain the location of the bandits from puffs of smoke when they used their rifles. Apparently they were using smokeless powder for no smoke whatever could be seen. However, their approximate location was guessed and bombs were dropped at points where they seemed to be hiding from view.

This contest lasted 35 minutes, during which 8 bandits were killed, two known wounded and the horses were all captured. The cooperation between the Skeleton Brigade and the planes made the feat possible.

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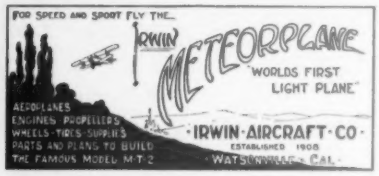

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(Continued on next page)

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Helicopters

(*Continued from page 232*)

same principle was used. The D'Ascanio helicopter, in which for the second time in helicopter history the Svachulay principles were used, was a more of a success than any of its predecessors. Its record of a five mile flight with 15 minutes in the air, arouses the hopes that the second edition of this machine with a stronger motor now nearing completion in Italy, will give better results.

In 1928 the author advised the Curtiss Company that their much advertised helicopter would not prove a success. And it did not. This was a rather an unfortunate occurrence, as it made further progress almost impossible in this line of research.

The author was present at many of these tests and incidentally interviewed the pilots. After studying these past records, he has come to regard 30 feet as the limiting climb of a helicopter. It does seem rather odd, that after all these years of research work, the altitude has not improved. The pilots say that the power is not sufficient to climb higher. The author claims, according to his experiments, that the ground effect is responsible for all results obtained.

The P. K. Z. helicopter lost its equilibrium many times as it reached high altitudes. It had to be pulled down from 150 feet to about 45 feet, and it then immediately regained its balance. Cemichen told me that the oscillation of the helicopter near the ground was continuous.

END

Model Manufacturers

Send out reprints of our Model Contest announcement with your mailing pieces. The reprints will be supplied free upon request.

Gliding

(*Continued from page 238*)

waved him to cut loose, but to no avail.

To a person on the ground, thirty miles an hour is stepping along, but to the man in the air, it is just a trot. Anyway when this dumb-bell did decide to pull the release ring he just wrote plain trouble for the whole club. I saw grief coming and I started on the lam for the scene. Just as I had it doped out he saw the danger of the fence and instead of nosing her down for speed and a little bank, he kept the nose up and tried to stretch the glide across the road. Well, it happened; he must have forgotten the telephone company had a habit of stringing wires around the highways.

Sailing along about thirty miles per he took the wallop on the righthand corner of the chin. Sliding down, the wire caught him full on the chest.

After taking out seven feet of slack on the cable he sailed far enough backwards to land in the confines of the airport, tail down. And what I mean is tail down. He stuck the tail assembly into the ground so hard that it left Mr. Wise Guy hanging aloft in the safety belt head down. I felt sorry until we got him down and found out he wasn't injured. Then I blowed him down and laid him amongst the sweet peas.

As soon as he got his wind back I took him around to survey the leftovers and talked to him long and furious. But what's the use, some guys just have to be wise like that I guess. Anyway it sure made me feel good on the inside to see this wise ninny crack up. That's all the satisfaction I did get 'cause it sure kept me working to get the crate in flying shape for the following Sunday.

And so it goes, thrills, joy and then a lot of grief at times, but it is worth it, every hour and every penny that you put in it.

END

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Howl Dept.

(*Continued from page 240*)

should be controlled by officials independent of either military or commercial aviation interests, particularly the latter.

Laws that are to affect civil aviation should be subjected to public opinion before they become effective.

While I am on this subject, why shouldn't the unlicensed pilots and experimenters organize? I am positive that most of them would hail the idea with delight. At any rate, results would be more swift and certain if we banded together for the benefit of all.

I wish to congratulate you in your fearless endeavor to protect civil aviation.

You will probably remember that Mr. Silsby submitted a letter to one of the early "Howl Departments".

END

Famous Jumps

(*Continued from page 224*)

*"I remember, very well indeed, the first jump I made. It was at Chanute Field, near Rantoul, while I was taking the airplane mechanics' course. Making a parachute jump is one requisite for graduation, and three of us were ready for our first jumps at the same time.

The day chosen was windy and bad; the wind had a ground velocity, as I remember it, of about twenty-eight miles an hour. The instructor decided to send just one of us up first, to see how bad the wind really was and, as I was the lightest, he chose me.

"My pilot, Lieutenant Frank Schilt, must have been feeling particularly humorous that day; at any rate, he did his best to give me a cheerful send-off. Reaching a certain point, he banked steeply, pointed over the side and looked back at me in the rear cockpit with a wide grin on his face. I looked down and saw what he meant—a graveyard!

However, I grinned right back at him. He went a little farther, and again turned to grin at me; there was another graveyard below! I answered his grin that time with a sickly smile. Still he wasn't through. A couple of minutes later he went through exactly the same performance and showed me a third graveyard! I didn't even try to smile: just set my teeth and, I suppose, turned yellow or green, or both.

"I meant to try landing on the airplane landing field, which was the most convenient large bit of open territory in that neck of the woods. I don't know just how long Chanute Field is, but probably it is not less than five hundred yards and maybe more. The hangars occupy one entire side.

"Near one of the corners is a dwelling house, while cata-cornered from it and clear across at the other end, is another dwelling house. I made up my mind to jump when we got over the second house, figuring that the wind would carry me back and that I ought to land somewhere near the middle of the field—the plane always heads into the wind on a premeditated jump.

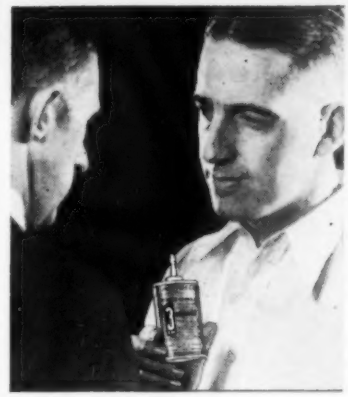
"WHEN we were two thousand feet up and directly over the house I had selected, I gave Lieutenant Schilt the signal. He cut the gun; I climbed out of the basket and dropped. On that jump I didn't try any monkey tricks, such as I have since—if you want to call them that. I had my hand on the rip cord when I left the plane, and yanked it without loss of time when I got in the clear.

"Now, the wind had far more force than I had figured. I was carried the entire length of the field and beyond, coming down in a kitchen garden back of the first dwelling house and wrapped a lot of potatoes and turnips around my neck. After that, the instructor decided it was too windy for parachute jumping and wouldn't let the others go up!"

Incidentally, Sergeant Atherton, while never hesitating to jump with a parachute, finds that he does not have sufficient "nerve" to dive twenty-five feet into the water.

END

(From JUMP by Neil M. Clark. THE AMERICAN MAGAZINE, February, 1928. By the courtesy of The Crowell Publishing Company, New York.)



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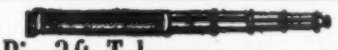

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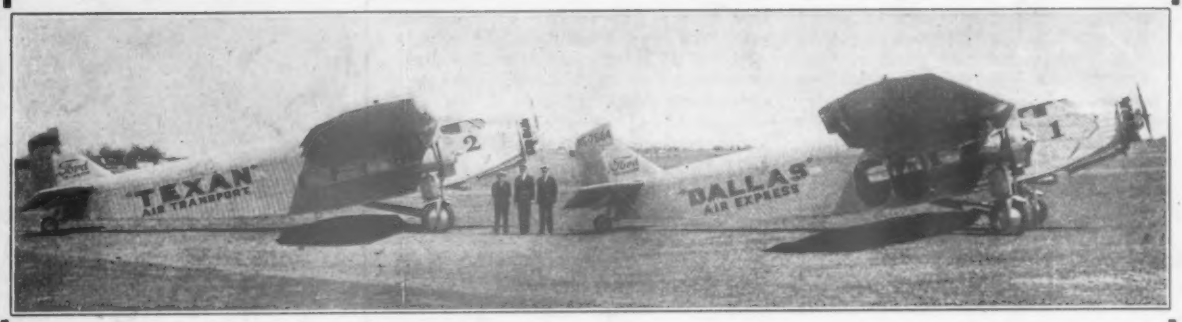

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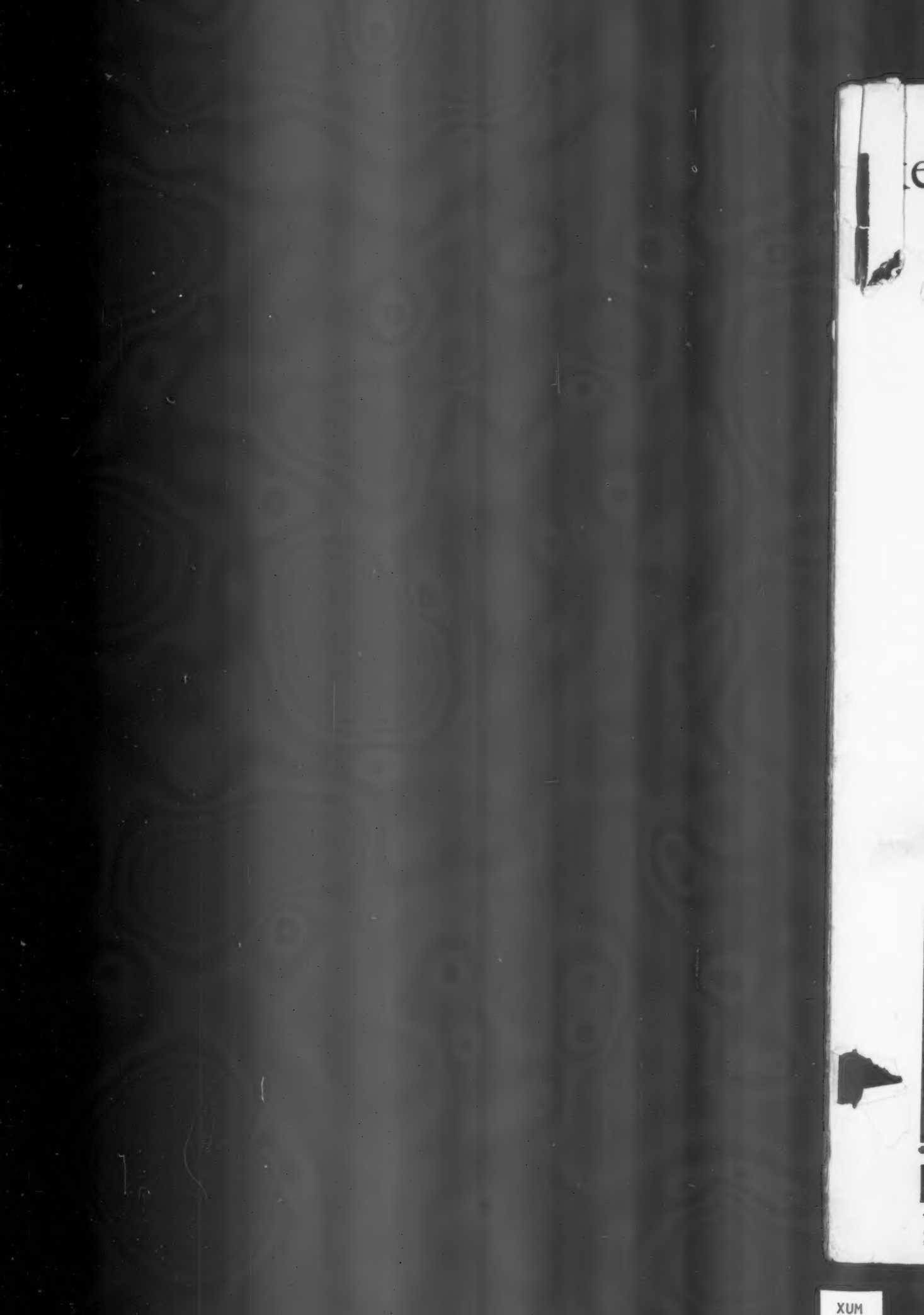

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eing held in Chi-
ed miles away.

* * *

the letters received,
ne that appeals to us.
Jack Macy, Chicago, Ill.,
s his mind in this manner:

*a to me that it is about time
this so-called streamlining stuff
ack the engine problem. By re-
the plane here and there, add-
nts or taking them off in favor
actible gear, it would seem that
ve about reached the limit.*

*, I suggest tackling the engine
n and show a better efficiency at
oint, which is sorely needed. We
double the output of the present
ngine and still be a long way
100 per cent efficiency. Truly,
re playing around with rockets,
ying to climb up into the strato-
where the air is thinner, but I
think that this is getting us any-
—at least during our lifetime.*

*pen though the more efficient engine
t be a little heavier, it would be
worth the attempt if the results
e commensurate with the increased
ght. By this, I mean, that if the
ight were doubled and the new en-
e showed only 10 per cent better
an twice the former efficiency, the
me would be well worth trying.*

Very true, within limits, but still we
re a long way from perfection in
reamlining and the reduction of par-
sitic resistance in general. Now let us
ssume that the lift-drag ratio of a cer-
tain ship is 16.0, which is just another
method of stating that one pound of
propeller thrust will suspend 16 pounds
of weight. Now it is evident that an
increase of one pound in the head re-
sistance would be equivalent to in-
creasing the weight by 16 pounds.
Thus, we see that a reduction of one
pound in the resistance would be the
equivalent of removing 16 pounds of
weight. We would sure have to trim
down the weight of the powerplant
considerably to gain the same results as
trimming off one pound of head resist-
ance.

* * *

THERE is a smug little colony of wise-guys in this country who claim that wing-slots can add nothing to the

(Continued on page 324)

Volume X

An Airy
The Career
Two Parachu
Here's the
A Cruise W
Our Warpla
How Army
Jumping The
Timing Aircr
The Why an
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